Mitigation used to properly graze forage will reduce the potential impacts of livestock grazing (both direct and indirect impacts) to these Sensitive plants Possible adverse effects could also be avoided through site-specific allotment planning and administration Range management practices can minimize the effects of livestock grazing on plants, including fencing, alternative water sources, and changes in grazing season All of these measures are specifically designed to reduce animal concentrations in any one particular area, and thereby reduce concentrated herbivory, trampling, and soil compaction

3) Recreation management activities -- The RGNF is the most lightly used Forest (see Tri-section analysis for recreation) in the Tri-section for recreation Recreation use, under all Alternatives, appears to have a relatively low impact on Sensitive plants Use around developed recreation sites, such as campgrounds, appears to be insignificant on Sensitive plants based on known occurrences and known habitats

Cross-country (travel off roads and trails) motorized use varies by Alternative. Alternative B allows the most area open for motorized cross-country use while Alternatives A and F allow the least Consequently, Alternative B has the highest potential for impacting Sensitive plants. However, none of the Alternatives appear to have significant impacts on Sensitive plants due to the infrequent and dispersed nature of the impact Rocky habitats supporting *Draba smithii, Gilia penstemonoides,* and *Neoparrya lithophila* are undoubtedly at very low risk from impact by off-road vehicle travel due to inaccessibility. The habitat for *Eriophorum altaicum* var. *neogaeum* is probably too wet for any significant degree of off-road vehicle use *Eriogonum brandegei* would not be at risk since it does not occur on the Forest (O'Kane 1988). The plants most susceptible are *Astragalus ripleyi, Botrychium echo, Botrychium pallidum, and Machaeranthera coloradoensis.* The reported occurrences for these plants are not especially attractive locations to off-road vehicle use If a vehicle did pass over one of these sites, there is no reason to believe that the use would be repeated and concentrated Thus, the risk of detrimental impact is suspected to be very low

The amount of new trail construction is projected to be three miles per year in all Alternatives except F, where there is no new construction This amount of disturbance is relatively low considering the size of the Forest This extremely low level of potential disturbance, coupled with site-specific Biological Evaluations and appropriate mitigation measures, should have little or no impact on Sensitive plants

4) Mineral Development -- Exploration or development for locatable, leasable, and salable minerals on the Forest is projected to be relatively low. The total disturbance is projected to be 219 acres over the next ten years for Alternatives NA, B, D, E, and G The total disturbance for Alternatives A and F is only 69 acres. This extremely low level of potential disturbance, coupled with site-specific Biological Evaluations and appropriate mitigation measures, should have little or no impact on Sensitive plants

5) Road Development -- Most of the new roads proposed by each Alternative would primarily impact subalpine closed-canopy forestland There are no Sensitive plant species primarily associated with this habitat. This extremely low level of potential disturbance, coupled with site-specific Biological Evaluations and appropriate mitigation measures, should have little or no impact on Sensitive plants

6) Fire Management -- The specific relationship of fire to each Sensitive plant species is not well understood. Lower-elevational LTAs, which evolved under a more frequent burning regime, have typically had fire suppressed this century Open forestland, shrublands, or grasslands within foothills and montane vegetation zones have probably been more influenced by past fire suppression actions compared to higher elevational zones on the Forest. These lower-elevation LTAs are potentially in need of prescribed fire to maintain natural ecosystem composition, structure, and function *Astragalus ripleyi* would probably benefit from a natural fire regime (Naumann 1990) Other vegetation zones and habitats are probably less in need of prescribed fire.

The amount of management-ignited fire acreage will be the same for all Alternatives, but the potential for developing prescribed natural fire areas will be greater in Alternatives A and F (see the Fire section in Chapter Three). Presumably, a closer approximation to the natural fire regime will benefit ecosystem diversity and, thus, indirectly benefit Sensitive plants. Of course, much more knowledge is needed on the timing and intensity of fire in relation to flowering, pollination, and seed/spore production on our Sensitive plants

7) Special Area Designation -- There are two botanical areas proposed for two Sensitive plant species on the Forest -- *Astragalus ripleyi* and *Neoparrya lithophila.* Activities are restricted in Special Interest Areas (SIAs), such as no timber harvesting and limiting road and trail construction Other activities are limited if they conflict with the values for which the SIA was designated. The designation of these areas would result in increased protection and monitoring of these Sensitive plants. The botanical areas are proposed for all Alternatives except NA

DETERMINATION OF EFFECTS

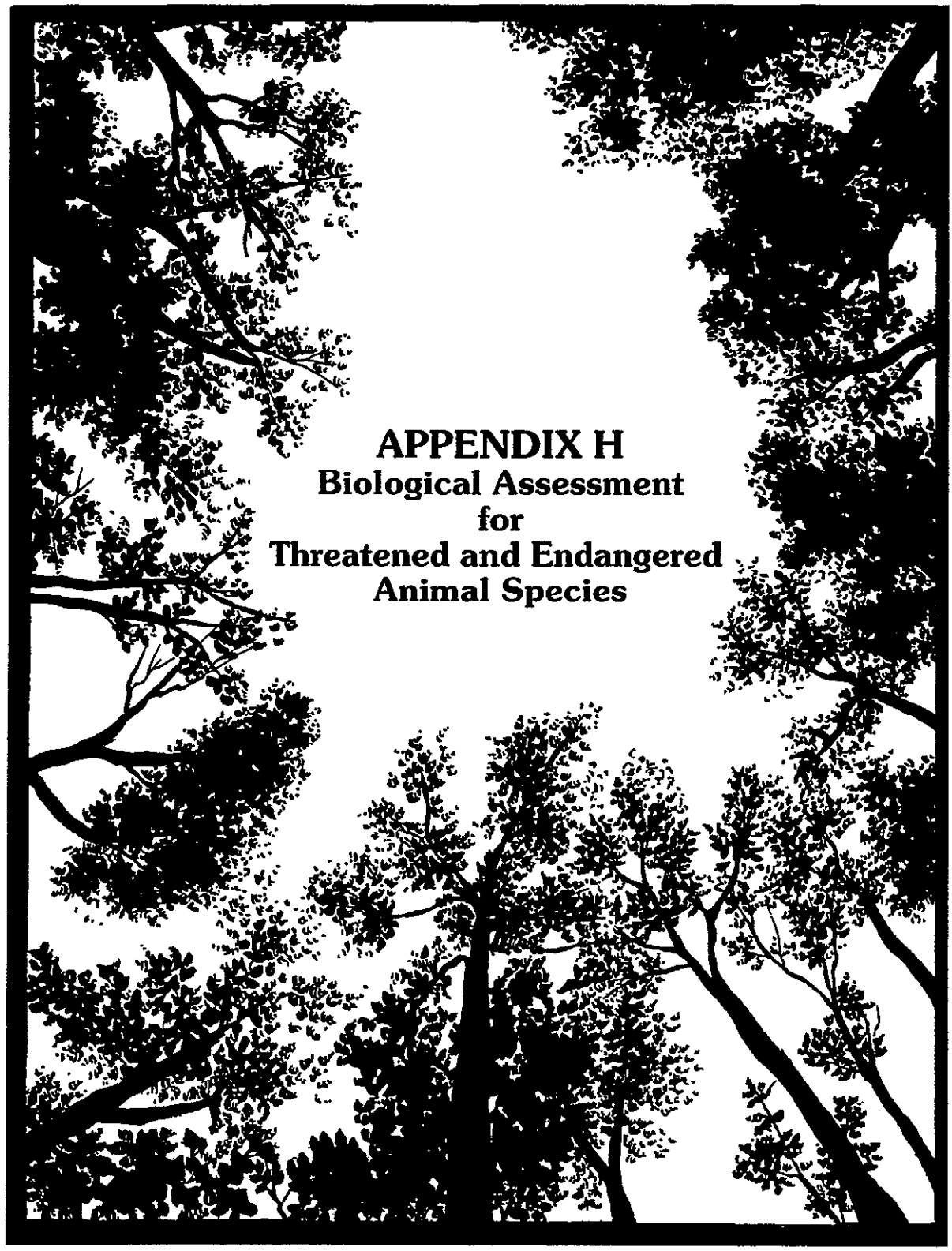
It is my determination that the proposed Alternatives will have "no adverse effect" on Threatened, Endangered, or Proposed plants It is also my determination that the proposed Alternatives "may adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend to federal listing or a loss of species viability rangewide" for Sensitive plants

The rationale for this determination is that none of the environmental consequences discussed revealed any major impacts to existing or potential habitat In addition, the proposed S&Gs as well as the requirement of a project level Biological Evaluation, provides additional protection to the habitat

Prepared By: Dean H. Erhard 10/17/96

Dean H Erhard
Ecologist

Date



APPENDIX H
Biological Assessment for Threatened and Endangered Animal Species

APPENDIX H
Biological Assessment for Threatened and Endangered Animal Species

INTRODUCTION

Following the requirements of the Endangered Species Act (ESA) this Biological Assessment addresses the potential effects from implementing any of the Alternatives proposed in the RGNF's Forest Plan to any Threatened or Endangered (T&E) species suspected of inhabiting the Rio Grande National Forest (RGNF).

Review of the species list from the U.S. Fish and Wildlife Service (USFWS) showed there are two T&E species known to occur on the Forest -- the American Peregrine Falcon and the Bald Eagle. While the RGNF may potentially have habitat for three other T&E species (Mexican Spotted Owl, Southwestern Willow Flycatcher, and Uncompahgre Fritillary Butterfly), they are not known to occur on the RGNF.

Neither the gray wolf nor grizzly bear appear on the species list because the USFWS does not recognize them as potentially occurring on the Forest. As a result, there is no requirement to address them in a Biological Assessment. However, because of the high public interest in these species, a limited assessment was done. It can be found in the TES Animals/Viability section in the Environmental Impact Statement.

Peregrine Falcons (*Falco peregrinus)* are closely tied to the availability of cliffs that they use for nesting. The falcons prey primarily on other birds, so they live near areas which support high bird numbers such as riparian areas. A Recovery Plan has been developed for the falcon and there was no Critical Habitat designated on the Forest. There are three known peregrine nests on the Forest and each of them have been active the past few years.

The Bald Eagles (Haliaeetus leucocephalus) are winter residents of the San Luis Valley and Forest. During the winter they seek out large trees with open canopies to roost. They feed on a variety of items with scavenging being a primary method of obtaining a meal. While there has been no accurate census taken, it is estimated that no more than 10-15 eagles spend parts of their winter on the Forest. The Eagle Recovery Plan did not designate any Critical Habitat designated on the Forest. There has been an increase in the number of Bald Eagles seen in the area over last several years.

Based upon the survey work done within the State, the habitat preference for the Mexican Spotted Owl (Strix occidentalis lucida) is steep-walled canyons within the ponderosa pine and pinyon-juniper habitats.

In 1989 a Mexican Spotted Owl response was heard in the Alamosa Canyon area during a survey by a Rocky Mountain Research Station crew trying to figure out the owl's distribution in the State. From 1990 to 1993, this area was surveyed with no further responses heard.

From 1990 to 1994 there was a Forest-wide effort to locate the owls with no success. A Recovery Plan has benn prepared and there was no proposed Critical Habitat designated on the Forest

The Uncompahgre Fritillary Butterfly (*Boloria acrocnema*) is a small butterfly (one-inch wingspan) that inhabits the alpine. It is associated with snow willow (Salix nivalis) above 12,000 feet, the snow willow provides larval food and cover To date only three colonies have been discovered, all of them north of the Forest in Hinsdale County

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is a subspecies of the Willow Flycatcher The existence of the subspecies in Colorado is unknown. Two inventory efforts were undertaken in the southwestern part of the State in the summer of 1994 There were no confirmed Southwestern subspecies located. While there are Willow Flycatchers on the RGNF, there is no good way to distinguish the various subspecies at this time.

The habitat of known Southwestern pairs consists of dense multi-storied riparian vegetation Once it was thought that the birds needed a willow/cottonwood overstory, but the birds have been found without the overstory trees The thought now is that the most important attribute is denseness of vegetation. Because of the small number of known birds and the variance in habitats, there is no qualitative data to describe the habitat Another early hypothesis was that the birds were not found above 7000' elevation That theory was nullified when birds were discovered as high as 9000' in New Mexico. The one attribute that has stood the test to date is riparian width No birds have been found when the riparian was less than 2-3 trees wide

The USFWS, Bureau of Land Management (BLM) and Forest Service have come to agreement on a habitat description for the State. Basically it is: the elevation below 8,500 feet and a stream gradient less than four percent within a geographic area roughly from the west side of the Sangre de Cristo mountains to the Utah state line near Dolores.

PROPOSED ACTION

The proposed action is the carrying out of any of the Alternatives described in Chapter II of the Final Environmental Impact Statement Incorporated with each Alternative is a series of Standards and Guidelines (S&Gs) They describe management activities needed to mitigate a potential impact and guide management toward a desired condition.

The Plan standards are

> Where new threatened, endangered, proposed, or sensitive species habitat is identified, an analysis shall be conducted to decide if any adjustments in the Forest Plan are needed
>
> Areas should be closed to activities to avoid disturbing threatened, endangered, and proposed species during breeding, young rearing, or at other times critical to survival Exceptions may occur when individuals are adapted to human activity, or the activities are not considered a threat

As new recovery plans, conservation agreements, conservation strategies, designation of critical habitat, or Regional documents which contain accepted management direction for TES species are developed, the Forest Plan will be reviewed to determine consistency with the new documents Where appropriate, the Plan will be amended to incorporate the new direction

The aquatic habitat should be managed to mimic reference stream conditions The assumption is that these reference streams represent a "natural" system and as such, they provide high quality habitat for aquatic species.

A certain amount of stubble height will remain at the end of the growing season There is the option to increase these stubble height requirements if in doing so a particular habitat objective would be reached. By restricting the amount of herbaceous forage that can be grazed there would be a concurrent restriction in the amount of woody vegetation that would be grazed The result would be to reduce the amount of grazing that is currently happening on the woody vegetation. This should allow an increase in woody vegetation in those riparian areas that can support that type of vegetation.

The Plan's guidelines are·

The standards and design criteria from the Draft Water Conservation Practices Handbook will be implemented which have proven to be effective in protecting soil and aquatic resources

If a bald eagle winter roost or nest site is discovered, a management plan will be written to ensure that the necessary habitat components are maintained

Discourage land-use practices and development that adversely alter or eliminate the character of the hunting habitat or prey base within ten (10) miles and the immediate habitats within one (1) mile of a peregrine falcon nesting cliff

Restrict human activities within one (1) mile of a peregrine falcon nest site between February 1 and August 31.

No ground-disturbing activity shall be allowed in potential Uncompahgre fritillary butterfly habitat unless a survey is conducted to determine the existence of the species. Ground-disturbing activities shall include such things as trail building, livestock driveways, or domestic sheep bedding grounds The usual grazing associated with livestock in the area is not considered ground-disturbing Potential habitat definitions and survey protocols are found in the Uncompahgre Fritillary Butterfly Recovery Plan

If any new Uncompahgre fritillary butterfly populations are discovered, a "no butterfly collecting" regulation will be placed on the area.

Do not allow any even-aged timber management within canyons considered to have potential habitat for Mexican spotted owls or within one-half mile of the canyon's rim

Allow uneven-aged timber management only if the resulting timber stand contains the necessary Mexican spotted owl habitat components

Develop a fire strategy within Mexican spotted owl potential habitat that will reduce the risk of losing the habitat to a catastrophic fire.

If any Mexican spotted owl nests are discovered, limit the amount of human disturbance around the nest through such measures as special area closures, seasonal restrictions, or rerouting of trails

In addition, another Biological Assessment will be done prior to project implementation. This helps prevent potential impacts, that escape a Forest-scale analysis, from being considered and mitigated.

ENVIRONMENTAL CONSEQUENCES

Bald Eagle

There will be very little, if any, impacts to the small number of bald eagles that use the Forest in the winter because:

There are minor amounts of suitable timber lands identified in the lower elevations which make up the wintering habitat.

The timber that will be harvested is primarily spruce-fir Spruce-fir rarely occurs in the wintering habitat

There is a guideline in place to address the discovery of any winter roost and nest sites.

The vast majority of habitat used by bald eagles is off the Forest. There are no known plans for any large-scale disturbance of the non-Forest habitat It is likely that there will be some loss of habitat as various landowners remove an occasional cottonwood tree that might have provided roosting habitat. This type of habitat loss would be very small and scattered so that the impacts to the eagles should be minor It is doubtful that the density of the wintering eagles has come close to approaching the capability limits of the habitat, as evidenced by the increased eagle sightings over the past years

PEREGRINE FALCON

There will be minimal adverse consequences to the three known falcon nests because.

There are minor amounts of suitable timber lands identified near the nests.

There is a guideline that will minimize human activities around the nest sites

The hunting habitat will not be adversely altered with use of the Plan's guideline.

The only other known falcon nest is located on BLM land. As a result, its protection will be provided for since the BLM is bound by the same provisions as the Forest Service regarding T&E species management The foraging activities of the falcons take them off the Forest It is likely that there will be some landowners who convert their lands from a shrub or treed habitat to agricultural land However, there are no known plans for any large-scale alternations to the potential foraging habitat The USFWS or DOW manage some prime wetland foraging locations and they will continue to manage them for the wetland values, so there should be limited impacts to the falcons from activities off-Forest

Uncompahgre Fritillary Butterfly

The impact to the butterfly's potential habitat will be small because:

> Use of the Plan's S&Gs will keep occupied habitat from being lost and provide a degree of protection from butterfly collectors.

There is potential butterfly habitat on patented mining claims, which is essentially private property. There would be a small risk of having the habitat altered during mining activities. However, considering the total amount of potentially suitable habitat, the amount occurring on the mining claims would be small and scattered Consequently, the cumulative impacts to the potential habitat would be limited

Mexican Spotted Owl

The impact to the owl's potential habitat will be small because:

> There are minor amounts of suitable timber lands identified in the canyons which make up the potential habitat.
>
> The timber harvested is primarily spruce-fir Spruce-fir rarely occurs in the potential habitat
>
> There is a series of guidelines that detail the management of any potential habitat and nest areas.

There is a small amount of potential owl habitat that occurs off-Forest Most of this habitat is on lands managed by the BLM Protection of these areas would occur since the BLM manages T&E species habitat similarly to the Forest Service There are no known plans for any major disturbances of the potential habitat by private landowners There will likely be some development on the private lands within the potential habitat The cumulative impacts would be minor because of the small amount of habitat that would possibly be altered

Southwestern Willow Flycatcher

There will be limited impact to the flycatcher's potential habitat because implementation of the S&Gs will improve the condition of the riparian areas on the RGNF By restricting the

amount of herbaceous forage that can be grazed there would be a concurrent restriction in the amount of woody vegetation that would be grazed. Consequently, there would be an increase in the amount and density of woody vegetation within the RGNF's riparian areas.

Most of the potential habitat for the flycatcher is found off-Forest, primarily on lands managed by the BLM While most of the lower-elevation riparian habitat is under private ownership, much of that would no longer be considered as potential habitat. This is a result of the many alterations the private riparian habitat has undergone for agricultural purposes Because the BLM manages T&E species habitat similarly to the Forest Service, the impact to the remaining potential habitat would be small.

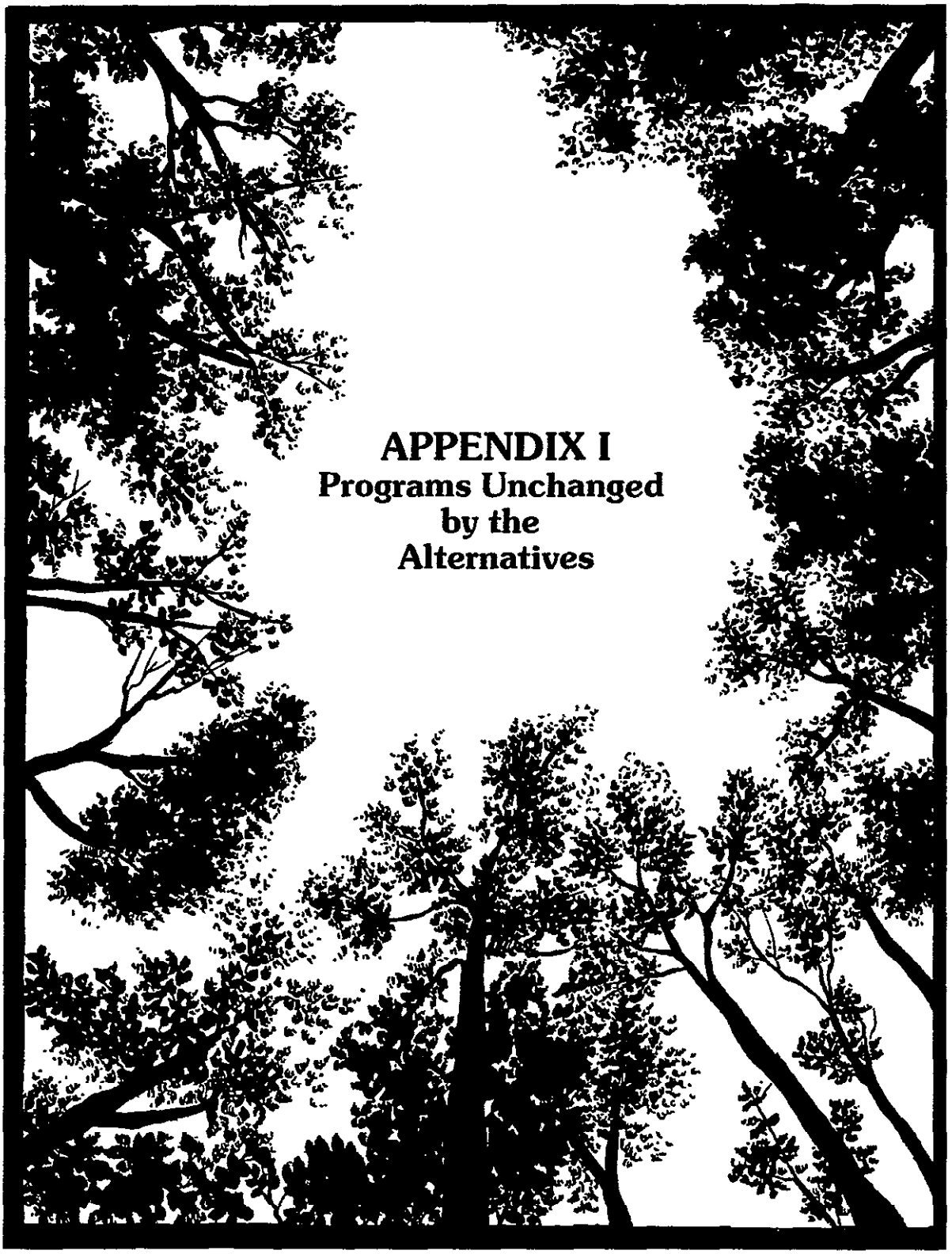
DETERMINATION OF EFFECTS

Based upon the limited environmental consequences, use of the S&Gs, and the requirement for another analysis prior to project implementation, I conclude that carrying out any proposed alternative will result in a "may effect, but not likely to adversely effect" determination for the T&E species on the RGNF

Prepared by: Rick Metzger 10/18/96

Rick Metzger
Forest Biologist

Date



APPENDIX I
Programs Unchanged by the Alternatives

APPENDIX I
Programs Unchanged by the Alternatives

INFRASTRUCTURE

Facilities will not be significantly affected between alternatives Some changes will occur regardless of the alternative selected Water system requirements are becoming more restrictive, existing developed sites are deteriorating, and economics will likely lead to closing smaller sites and improvement and expansion of larger sites. The Forest will design new facilities to be accessible and upgrade existing facilities for accessibility Changes in other alternatives will probably relate to the relative emphasis of developed versus dispersed recreation, and motorized versus nonmotorized recreation.

The Forest owns or lease 71 buildings, including offices, administrative sites, work centers, and guard stations The number of Forest Service buildings has remained about the same over the last decade, some new buildings have replaced aging ones or ones that were too small From time-to-time, when opportunities arise to share office space or if there are personnel changes, the need for Forest Service-owned structures may fluctuate , but no significant change in the number of structures or the acres occupied by administrative sites is anticipated

Various routine activities will continue, regardless of the Forest Plan Revision Examples of these activities include sewage and solid wast collection and disposal; potable water testing and maintenance of drinking water sources, Forest Service vehicle purchase, lease, sale, and maintenance; building and grounds maintenance, campground repair and maintenance; and placement and maintenance of signs

LANDS AND REAL ESTATE MANAGEMENT PROGRAM

The Lands and Real Estate Management Program on the Rio Grande National Forest consists of five primary activities

(1) the issuance and administration of various special-use permits and easements to authorize the use and occupancy of National Forest System lands,
(2) land adjustments consisting of land sales, exchanges, interchanges, and acquisitions by purchase or donation,
(3) rights-of-way acquisition and grants,
(4) boundary line location, maintenance, and management, and
(5) encroachment and trespass resolution

The Forest Service administers about 1.86 million acres on the Rio Grande National Forest, with more than 1 96 million acres within the Forest Service's boundaries Approximately 103 5 thousand acres of land within the Forest's boundaries are in private ownership.

Private ownership within the Forest is small, just 5 percent, when compared to many other National Forest within the Rocky Mountain Region. This ownership, to a large extent, is concentrated along the bottom of the major drainages and within the several mineralized areas

Many patented lands have been subdivided or broken into 40 acre parcels and sold for recreation cabin sites or residential use near town The more isolated tracts are generally kept intact and used for recreation cabin sites.

The private landownership within the Forest boundary has placed demands upon management of the Forest This has contributed to the Lands and Real Estate Program, as follows·

Non-recreation special-use permits and easements. Special-use permits and easements are documents that authorize individuals, organizations, or other agencies to occupy or place improvements on the Forest Easements are usually issued for roads, such as those that cross National Forest System land to reach private land. Special-use permits are issued (among other things) for utility lines, which cross the Forest, and for other occupancy purposes. In the fall of 1994, there were 210 nonrecreation special-use permits and easements on the Rio Grande National Forest. Permitted areas range in size and are generally less than 10 acres, except pastures The number of annual requests for new utility lines and road easements is around ten.

Landownership adjustments. Since 1985, the Rio Grande National Forest has completed about five land exchanges under authority of the General Exchange Act of 1922 For every acre patented (acquired by a private owner) through these exchanges, the Forest acquired about four acres

Between 1985 and the fall of 1994, the Rio Grande National Forest completed around 10 exchanges or sales under authority of the Small Tracts Act. The Small Tracts Act provides authority for the Forest Service to sell small parcels of land (up to 10 acres) on which there are high-value encroachments (such as houses), and to dispose of "mineral fractions" (small isolated parcels of the National Forest surrounded by private land (up to 40 acres))

Since 1984, the Forest has purchased about 30 acres with funding from the Land and Water Conservation Fund These purchases are generally of private lands within designated wilderness areas

Rights-of-way acquisition The Forest Service acquires rights-of-way from private landowners and other entities. These rights-of-way provide access to isolated parcels of National Forest System land or make Forest management more efficient The rate of acquisition varies with funding In Fiscal Year 1994, the Rio Grande National Forest acquired about 5 rights-of-way

Boundary lines There are an estimated 1393 miles of Rio Grande National Forest boundary By the fall of 1994, 324 miles had been surveyed and marked to current standards. Landline boundary and posting are done before any resource activities bordering ownership, and with rights-of-ways

activities There are 780 miles needed to complete the location of all boundary lines between National Forest and Private or State lands by the target date of 2020 contained in the Resource Planning Act. This would require 31 miles of boundary per year The mileages do not include boundaries between National Forest and other Federal agencies that are an additional 288 miles.

Encroachment and trespass: Encroachment and trespass mean the unpermitted construction or placement of structures or objects on Forest System lands. Encroachment and trespass most frequently occur in areas of intermingled private and Forest System lands, problems are usually identified as part of boundary line surveys Cases range from houses or garages built partially or entirely on Forest System lands, to fences, parked cars and piles of boards Some cases of encroachment can be resolved through the Small Tracts Act. Most cases of trespass can be resolved by the owner's moving the objects onto private property The Forest Service handles several encroachments and trespass cases a year

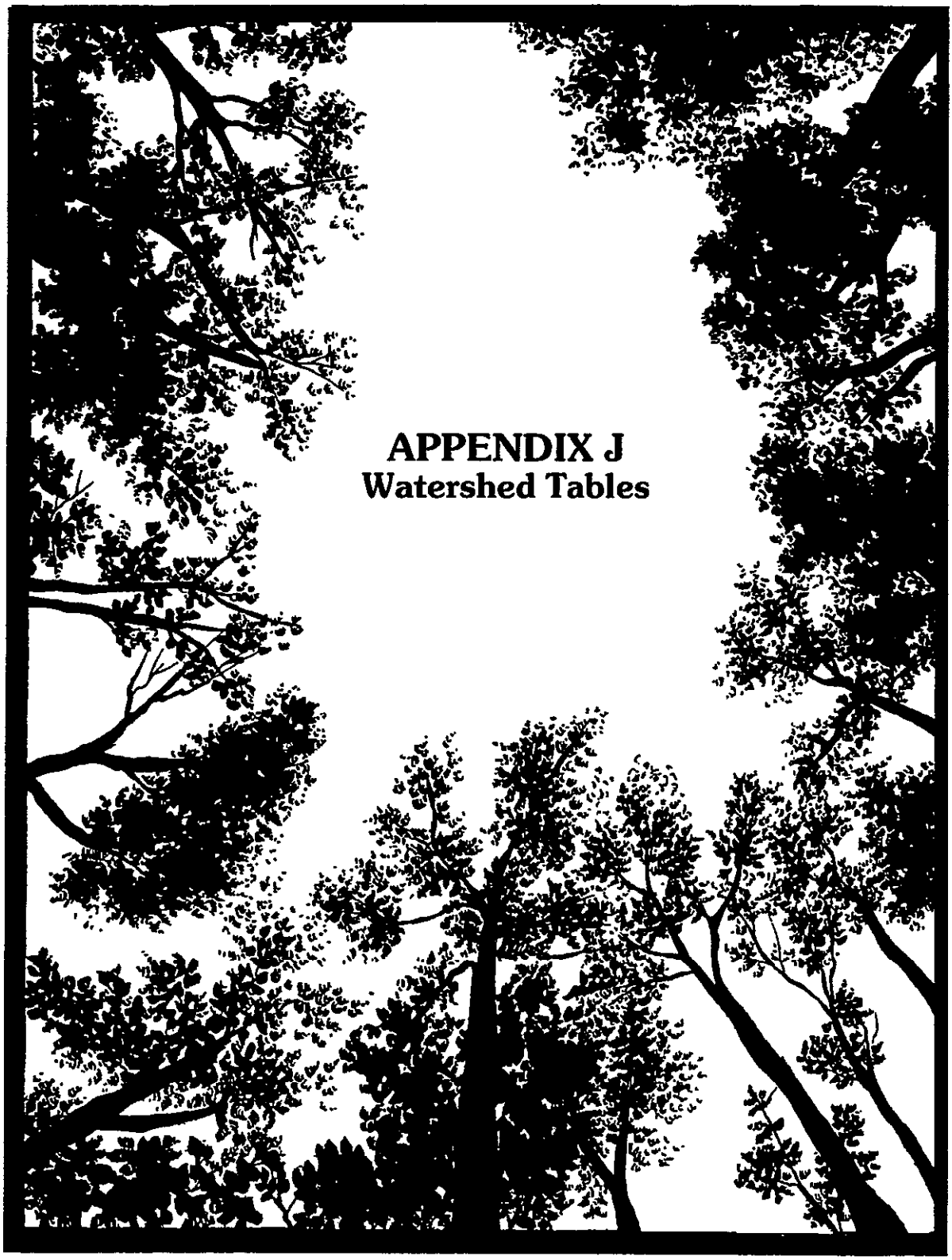
Subdivision of private lands will continue, and there will be increased demand for special uses and easements on the National Forest under all alternatives. A detailed landownership adjustment analysis was prepared for the Forest and will be incorporated into the Forest Plan There will be no appreciable difference to the Lands and Real Estate Management Program, regardless of the alternative chosen to revise the 1985 Forest Plan

FIREWOOD, CHRISTMAS TREES, AND TREE TRANSPLANTS

The Forest operates a permit system that allows for the collection of both firewood and Christmas trees, and allows for the taking of live seedlings, saplings, or shrubs from Forest System lands for transplanting elsewhere.

For the most part, the entire Forest is open to the collection of dead fuelwood, unless otherwise designated Persons wanting to collect firewood or Christmas trees or who want to transplant live seedlings, saplings, or shrubs from Forest System lands must obtain a permit from the Ranger District offices. There may or may not be fees associated with these permits

Demand for permits may fluctuate, but such fluctuations are likely to be caused by human population changes or other factors beyond the influence of the Forest Plan Revision Availability of firewood is the most likely aspect to change; it is discussed in the Timber Resources section in Chapter 3 of the EIS



APPENDIX J
Watershed Tables

APPENDIX J
Watershed Tables

REFERENCE STREAMS

Stream health comparisons will be made to the most appropriate reference stream to best reflect climate, drainage area and other site specific conditions.

The classification system used here was developed by Dave Rosgen. His system has changed over time Classifications listed in Table J-1 were derived using an edition prior to his latest and may be slightly different using the latest version.

The long reaches described in Table J-1 often have short stretches with different classifications than that specified Defining the classification of those short stretches may be desirable in the future in order to make stream comparisons that will become necessary.

Stream classifications range from A-G and from 1-6 A-G refers to the stream gradient, valley/channel form and sinuosity, and 1-6 refers to substrate size. Deeply entrenched channels are As or Gs, slightly entrenched channels are Cs or Es Substrate size of 1 refers to bedrock and 6 refers to silt/clay For example, a deeply entrenched, steep gradient stream with boulders would be an A2 type A slightly entrenched, or flat valley bottom, low gradient stream with a gravelly substrate would be a C4 or E4, depending on the width/depth ratio and sinuosity.

TABLE J-1. Classification of Reference Streams

Stream Name, Location & Reach No	Reach Classification & Mileage	
1 Decker Creek (Divide Ranger District)		
Reach 1	B3	0 6 miles
Reach 2	A2	1 4 miles
Reach 4	C5	0 14 miles
2 El Rito Azul (Conejos Peak Ranger District)		
Reach 3	B3	1.5 miles
3 Hansen Creek (Conejos Peak Ranger District)		
Reach 1	A3	2.4 miles
Reach 2	A3	1 2 miles
4 Hope Creek (Divide Ranger District)		
Reach 1	A3	0 9 miles
Reach 2	B1	1 0 miles
Reach 3	A3	1 5 miles
5 Ivy Creek (Divide Ranger District)		
Reach 1	A2	0.9 miles
Reach 2	B1	1 6 miles
Reach 3	A2	0 9 miles
Reach 4	B1	0.7 miles

Stream Name, Location & Reach No.	Reach Classification & Mileage	
6 Ute Creek (Divide Ranger District)		
Reach 4 (Main Ute)	C3	1 2 miles
Reach 5 (West Ute)	B3	4.4 miles
Reach 6 (Middle Ute)	B3	1 3 miles
7 South Fork of the Rio Grande - above Big Meadows (Divide Ranger District)		
Reach 1	B2	0 5 miles
Reach 2	A2	1 0 miles
Reach 3	A1	0 3 miles
Reach 4	B3	0 5 miles
Reach 5	B3	0 9 miles
8 Wannamaker Creek (Saguache Ranger District)		
Reach 1	B3	2 0 miles
Reach 2	B3	2.0 miles
Reach 3	A3	0 5 miles
9 Wolf Creek (Recent logging on private land in this drainage has made this a questionable reference stream)		
Reach 1	B3	0 8 miles
Reach 2	A3	0 8 miles
Reach 3	A3	1 2 miles

TABLE J- 2. Reference Stream Attributes and Values

STREAM CODE	% ERODING BANK/REACH	% FINES/REACH
A1 (sample size = 1)		
Range	NA	NA
Mean	0	3
A2 (sample size = 4)		
Range	0-2	3-14
Mean	5	9
A3 (sample size = 7)		
Range	0-9	2-17
Mean	2 6	9 3
B1 (sample size = 3)		
Range	0-4 5	3-10
Mean	2 6	6 7
B2 (sample size = 1)		
Range	NA	NA
Mean	0	8
B3 (Sample size = 9)		
Range	0-7	1-42
Mean	3	15
C3 (sample size = 1)		
Range	NA	NA
Mean	3 5	4
C5 (sample size = 1)		
Range	NA	NA
Mean	0	48

RESERVOIRS & WATER DIVERSIONS

About 30 other ditches and pipelines divert water from Forest streams for irrigation, recreation, and domestic purposes These diversions are not major and are described in detail in special-use permit files.

Table J-3. Major Reservoirs

Reservoir Name	Capacity (Acre-feet)	Reservoir Name	Capacity (Acre-feet)
Rio Grande	51,110	Poage	190
Continental	26,720	Shaw	490
Beaver Creek	4,430	Regan	520
Platoro	67,800	Trout	200
Road Canyon	2,800	Goose	230
Archuleta	110	Wee Ruby	190
Spruce No 1	50	Hunters	50
Spruce No 2	110	Jumper	?
Fuchs	210	Trujillo Meadows	?
Brown (Troutvale)	710	Rito Hondo	?
Squaw	160		

Table J-4. Transmountain Diversions

Diversion	Receiving Stream	Quantity (Acre-feet)	Losing Stream
Tarbel Ditch	Lake Fork Saguache Creek	172	
Tabor Ditch	Spring Creek	1,435	
Weminuche Pass Ditch	Weminuche Creek	2,088	
Pine River/Weminuche Pass Ditch	Weminuche Creek	873	
Williams Cr /Squaw Pass	Squaw Creek	253	
Don La Font Ditches	Goose Creek	447	
Treasure Pass Diversion Ditch	Pass Creek	613	
Medano Ditch		385	Medano Creek
Hudson Branch Ditch		100	Medano Creek

ABANDONED MINES

The abandoned mine inventory is not complete yet As more work is completed, sites that are on the Forest will be added to this list.

Table J-4. Abandoned Mine Inventory

SITE NAME	DEGRADATION RATING
Conejos Peak Ranger District	
Schinzel Flats	3
Gilmore Meadow	3
Big Lake (one adit appears to be on RGNF)	3
Globe Mine	3
Lower Orinoco	3
Ferrocrete Mine	2
Eastern Star Tunnel	3
Grape Mine	3
Red Mountain Tunnel No 1	3
Watrous Claims	2
Divide Ranger District	
Gold Bug Mine (Opening 105)	2
Soloman Mine (a thin inlier on RGNF)	2
Commodore and Amethyst Mines (Parts on RGNF)	1
Southwest Embargo	2
Central Embargo	3
Saguache Ranger District	
Cocmongo Mine	3
Tailings 201 (Confluence of Kerber, Squirrrel, Rawley Creeks)	3
Superior Mill	2
Rawley 12	1
Joe Wheeler Mine	1
Morning Star Mine Area -1	2
Golden Age Mine Area	2
Uper Spring Creek Mine -1	2
Upper Spring Creek Mine -2	2

Upper Spring Creek Mine -3	2
Spring Creek Mines	2
Alder Creek Mines	2
Villa Grove Turquoise Mine	2
Morning Star Mine Area -1	3
Morning Star Mine Area -2	3
NE Morning Star -1	3
NE Morning Star -2	3
NE Morning Star -3	3
NE Morning Star -4	3
Little Darling Mine Area -1	3
Little Darling Mine Area -2	3
Manitou Sunlight Mine Area	3
Upper Spring Creek Mine -4	3
Upper Spring Creek Mine -5	3
Spring Creek Mines -2	3
Spring Creek Mines -3	3
Alder Creek Mines - 2	3
Alder Creek Mines - 3	3
Environmental Degradation Ratings (1) Extreme (2) Significant (3) Potentiallly Significant Sites listed are on, or might be on, the Rio Grande National Forest Sites inventoried on private land are not included	

WATERSHED ASSESSMENT

Table J-5 contains information from a forestwide disturbance assessment This information was revised and updated since publication in the DEIS

Table J-5. Watershed Assessment for Final Plan - 17june96
(Analysis Watersheds Only)
Buffered Stream = Area of All Streams Buffered by 100 Feet - Acres

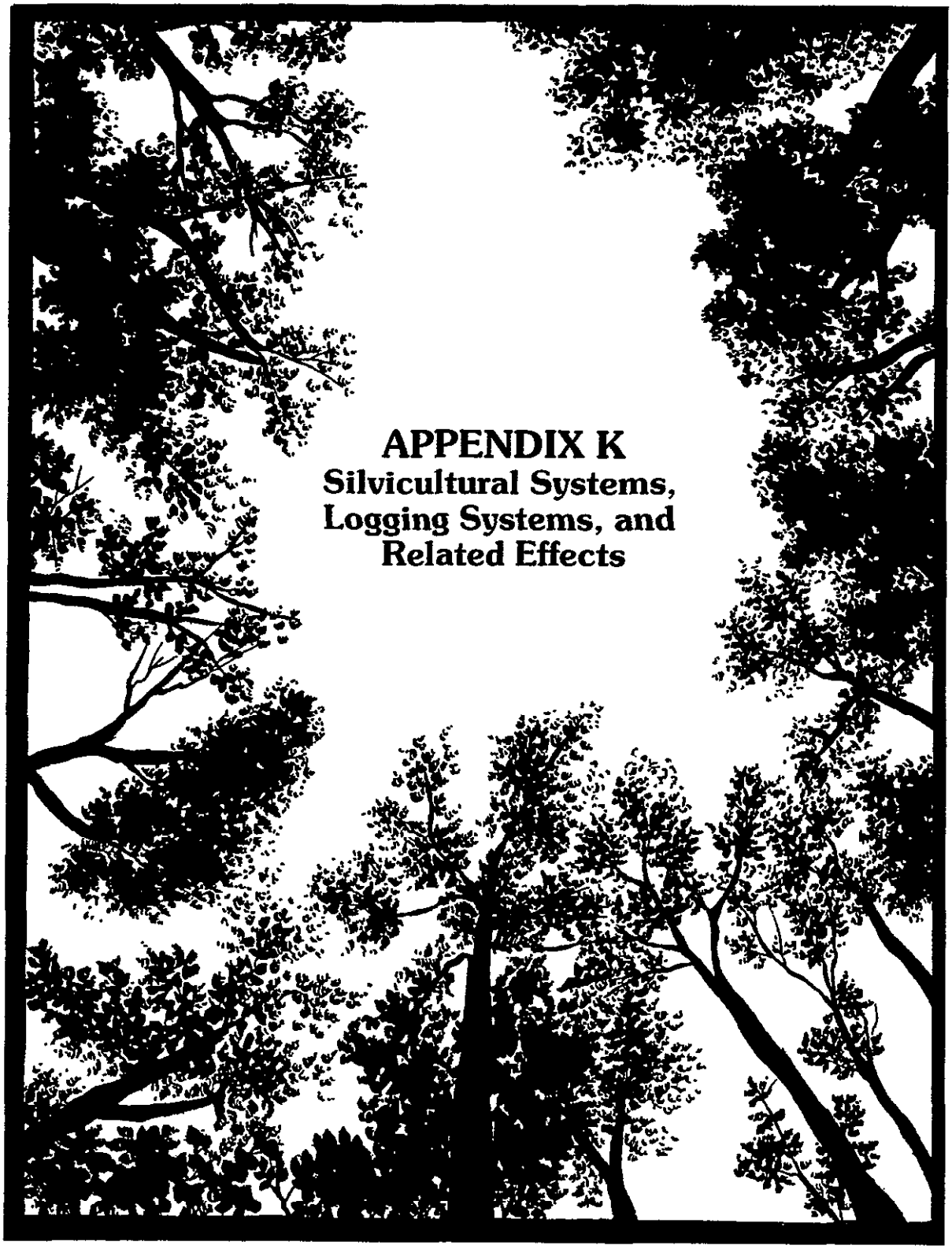
ANALYSIS WATERSHED	Stream name	WS ACRES	% BUF STR W/ TRNS AC	% of WS W/TRNS AC	% of WS IN BUF STRM	%WS in High Ero haz	% WS CUT	% WS DIST	Major Problem	Notes
13010004010307 00	Unnamed Trib to Sag Cr	2071 13	5 76	2 51	34 44	69 68	0 00	62 38	Gullies/Ero	Watersheds of Concern
13010004090106 00	Cave Cr	5981 30	6 40	3 48	22 72	85 77	9 92	17 71	Timber/Roads	
130100010603 00	Workman Cr	1175 68	3 49	4 08	42 19	41 65	24 22	17 42	Timber/Roads	
130100011103 00	Rio Grande Composite	14810 24	6 16	3 22	31 49	72 78	0 00	16 77	Roads/Subdiv	
13010005060301 00	Rito Hondo Cr	5207 17	3 99	3 75	44 61	17 30	18 45	16 55	Timber/Roads	
13010004020501 00	Cantonment Cr	1492 45	9 29	5 06	37 28	75 00	15 28	16 50	Timber/Roads	
13010001120101 00	Difficult Cr	2434 30	4 47	5 11	18 57	10 00	11 58	16 46	Timber/Roads	
13010004090103 00	Miners Cr (S Fk Carnero)	4182 35	6 18	2 57	21 40	50 81	12 47	15 84	Timber/Roads	
13010004030102 00	Hat Spgs Cr Upper	2874 96	3 57	6 80	32 54	50 00	10 74	15 20	Timber/Roads	
130100030104 00	Upper San Luis Cr	10683 48	11 07	10 60	55 67	3 52	0 00	14 81	Roads	
13010005050101 00	Rio de Los Pinos Trib	1063 87	7 43	6 04	50 72	5 00	10 31	14 02	Timber/Roads	
130100040202 00	Saguache Cr (Allen, Grouse, Moon)	14761 13	4 42	3 80	29 60	71 32	9 57	13 05	Tim /Rds /Gul	
13010001130501 00	Upper Park Cr	7536 20	2 73	2 47	60 87	7 44	18 42	11 95	Timber/Roads	
13010001130701 00	Beaver Cr /Race Cr	14103 21	1 82	1 45	54 35	56 46	16 92	10 36	Timber	
13010003020104 00	Copper Gulch	1283 25	11 13	4 12	20 79	0 00	0 00	4 12	Roads	
130100040804 00	Boland, Laughlan Gulch	6041 72	5 85	2 04	27 93	50 28	0 92	14 74		Remaining Watersheds are ranked from highest to lowest percent disturbance
130100040404 00	Taylor Canyon	4864 58	4 64	3 09	44 74	44 16	15 31	14 33		
130100010802 00	West Willow Cr	12209 15	6 89	4 41	24 95	31 31	0 39	14 11		
130100011303 00	Pass Cr	14164 54	3 77	3 05	43 82	32 74	15 14	13 70	Tim /Rds /Rng	
130100040103 00	Middle Fork Sag Cr	22504 28	0 90	0 60	36 94	49 08	0 00	13 42		
13010005040301 00		1760 57	6 57	4 04	36 24	0 00	12 44	13 10		
13010001020108 00	Corral Cr	1201 77	3 19	4 76	45 35	59 07	10 97	12 77		
13010001020106 00	Continental Res/Pearl Lakes Comp	8811 08	3 25	3 05	32 32	66 41	19 77	12 55		
13010001060702 00	Lime Cr	7775 18	4 29	3 44	29 60	46 10	10 13	12 44		
130100040901 00	South Fork Carnero Cr	28201 21	3 96	2 15	28 22	58 12	6 97	12 39		
130100040403 00	E Pass Cr	9324 71	5 82	3 74	32 68	26 40	10 32	12 09		
130100011101 00	Blue Cr	7873 81	2 09	2 42	16 20	69 56	15 87	11 91		
13010001020302 00	Mason Cr	2850 24	2 85	2 48	47 50	65 52	6 54	11 74		
13010004090101 00	South Fork Carnero Cr (Upper)	4661 10	5 43	3 17	26 19	50 58	4 76	11 66	Timber/Roads	
13010001150501 00	Shaw Cr	2046 87	5 05	3 86	28 56	69 84	16 82	11 57		
130100040301 00	West Park/Hat Sprgs Cr	10835 20	3 21	3 93	33 20	37 62	7 07	11 50		

13010003020106 00	Slaughterhouse Cr	2994 93	2 00	1 74	35 14	10 39	7 58	11 42	Tim /Rds /Gul
13010004090201 00		5205 00	5 83	3 28	26 48	45 41	15 02	11 23	
130100010502 00	Middle Cr (Creede)	5095 48	2 37	1 85	39 34	5 44	12 38	10 93	Tim/Rds/Rng
130100040601 00	Jack's, Vulcan Crs	3574 89	5 05	3 79	28 52	17 49	6 92	10 86	
13010004100201 00	Perry Cr	2826 44	4 41	2 72	19 65	17 53	11 91	10 85	
13010001120102 00		3194 90	6 08	4 15	35 40	10 00	8 46	10 80	
130100040201 00	Bear Cr (Sag Cr Trib)	10301 04	3 22	2 69	31 31	50 63	6 59	10 38	
130100030101 00	Clover Cr	5005 31	3 35	2 27	32 01	9 83	1 40	10 33	
13010003020101 00	Kerber Cr Upper	3313 48	4 50	1 87	30 70	16 74	5 99	10 02	
130100040902 00		11551 40	5 11	3 06	30 89	48 24	9 30	9 88	
13010004100101 00	Benino Cr	4939 66	1 93	1 75	30 16	30 18	11 69	9 55	Timber/Roads
130100011201 00	Alder Cr	13722 85	3 61	3 23	23 70	76 48	7 25	9 45	Timber/Roads
130100040104 00	S Fork Sag Cr	28643 08	0 79	0 48	34 54	50 53	0 00	9 37	
13010004060301 00		2292 25	6 68	3 87	42 40	10 00	12 72	9 32	
130100040402 00		6834 43	3 39	2 62	46 03	17 08	2 77	9 31	
130100040205 00	Luders, Jakes, Cantonment, Benny Crs	14822 93	3 34	2 18	46 90	68 91	7 06	9 14	
130100011304 00	Lake Fork Cr	6735 63	2 04	2 01	55 77	15 11	6 98	9 13	
13010001130702 00	Little Beaver Cr	4205 46	1 43	1 13	53 37	70 49	18 03	8 92	
130100040501 00	Houselog Cr	19265 03	4 02	2 07	27 39	39.35	9 43	8 90	
13010001020107 00		4681 48	1 87	2 48	21 26	55 58	12 37	8 75	
13010004020301 00		1148 65	5 00	4 50	43 72	30 00	5 79	8 72	
130100030102 00	Alder Cr	3341 41	2 95	2 93	32 82	15 48	1 00	8 71	
13010001150502 00	W Fork Shaw Cr	3043 11	3 51	4 17	41 48	65 03	8 36	8 68	
13010003020108 00		2793 22	0 98	1 47	30 95	37 19	2 18	8 46	
130100040302 00		7371 50	4 12	3 01	28 74	41 39	4 67	8 41	
13010001130703 00	Cross Cr	6537 28	1 78	1 43	19 54	74 09	10 89	8 30	Timber/Roads
130100010801 00		13319 13	1 94	0 71	24 92	69 61	0 56	8 28	
130100011305 00	Park Cr	26276 24	2 41	2 06	57 39	47 47	10 44	8 24	
13010004060302 00		1995 82	5 99	4 02	36 92		11 25	7 47	
13010002040101 00	Trib to S Fork Rock Cr	1355 32	3 98	2 91	47 43	22 89	7 01	7 46	
13010005060204 00		3053 40	3 15	2 95	33 91	2 13	5 93	7 43	
13010003020102 00	Squirrel Cr	2360 10	3 53	2 05	36 99	10 34	3 69	7 29	
130100020201 00	W Fork Pinos Cr	15348 39	1 57	1 06	48 45	72 00	8 48	7 07	
130100011502 00		10272 65	2 63	1 79	28 06	60 59	8 85	6 85	
130100040502 00		12739 19	4 18	1 80	27 29	37 59	3 90	6 82	
13010003020301 00		4597 41	2 48	1 69	40 77	14 86	0 08	6 74	
130100040401 00	Sheep, Bear, Spanish, Spruce Crs	16851 62	3 22	1 91	28 51	47 17	6 41	6 47	
130100010305 00		17323 01	3 21	1 88	35 96	42 48	8 80	6 45	
13010005060302 00		6013 77	3 02	3 35	54 02	14 29	4 45	6 45	

13010004070206 00		2094 44	8 54	4 17	34 43		3 04	6 39	
130100020202 00		13725 90	2 50	2 14	54 46	47 05	7 62	6 33	
13010004090204 00		3671 81	5 37	3 43	40 25	47 48	2 42	6 26	
13010001150302 00		4802 75	3 13	4 62	39 80		2 95	6 19	
130100011504 00		10750 48	4 50	4 67	65 75	13 06	1 77	5 96	
130100050302 00		5801 66	2 83	2 17	36 75	3 24	5 71	5 88	
13010002050405 00		3657 16	1 33	1 45	57 62	62 05	5 94	5 80	
130100011402 00		8941 06	2 50	2 18	60 65	31 41	0 00	5 65	
13010001030507 00		3723 05	4 17	4 16	51 56	30 39	2 01	5 62	
130100010610 00		14673 27	2 37	3 01	45 59	37.48	0 00	5 53	
130100030103 00		3773 19	2 23	2 08	45 56	19 68	0 86	5 42	
13010005060401 00		2514 04	5 06	5 41	70 01		0 00	5 41	
130100011501 00		9547.00	2 44	2 54	46 14	40.18	3 80	5 39	
13010001020304 00		9468 22	3 19	2 27	35 75	47 06	4 17	5 31	
13010001020109 00		4553 18	3 16	3 13	37 70	47 00	1 01	5 14	
13010004060102 00		1140 60	7 77	4 55	38 83		0 24	4 95	
13010001080202 00		10543 73	7 51	4 76	25 48		0 25	4 93	
13010001130704 00	Beaver Cr (lower)	7816 73	2 12	1 70	47 15	88 32	5 04	4 92	
13010002030405 00		10764 12	3 92	4 72	40 25	0 01	0 00	4 72	
130100040802 00		8963 33	2 38	1 73	59 99	18 01	0 44	4 66	
13010001150604 00		5682 26	3 98	4 64	53 23		0 00	4 64	
13010002010302 00		1276 88	1 20	4 63	26 21	32 44	0 00	4 63	
130100040602 00		5404 97	2 48	1 99	29 50	26 96	3 82	4 60	
130100030202 00		13508 02	2 63	1 49	44 47	24 73	0 20	4 57	
13010003020103 00		1160 26	6 51	4 34	21 32		0 00	4 34	
13010002050401 00		1438 57	5 33	4 31	51.23		0 00	4 31	
13010003020107 00		4055 53	0 88	0 49	28 23	4 74	2 61	4 27	
130100010612 00		12230 66	3 35	2 73	40 86	29 36	0 80	4 23	
130100040102 00		11183 82	3 91	2 97	27 58	49 89	0 00	4 13	
13010003020104 00	Copper Gulch	1283 25	11 13	4 12	20 79	0 00	0 00	4 12	Roads
130100010902 00		18289 68	0 76	0 46	30 95	47 22	0 30	4 08	
13010002040206 00		2750 32	3 88	3 62	73 43	3 82	0 62	4 07	
13010001020202 00		7681 12	2 62	1 72	17 85	45 05	2 55	4 04	
130100010204 00		17463 94	1 98	2 04	42 77	51 92	1.93	3 94	
130100011506 00		14905 15	2 82	2 93	51 23	26 72	1 00	3 83	
130100011309 00		18934 42	2 81	2 08	49.99	71.90	2 79	3 75	
130100040101 00		13605 69	2.03	1.84	34 02	34 35	0 00	3 75	
130100020502 00		10155 91	1 40	1 56	74 57	11 53	2 84	3 63	
13010002040102 00		9535 25	2 41	1 52	50 49	43 71	3 44	3 62	

130100010602 00		2489 79	0 31	0 51	50 80	15 11	4 06	3 47	
130100040801 00		16592 46	2 92	1 61	38 80	30 25	3 87	3 46	
130100010606 00		18994 55	1 90	2 20	30 46	15 62	1 05	3 37	
130100011503 00		1149 54	4 38	3 30	55 67	19 43	0 00	3 30	
13010004080401 00		2199 39	7 24	1 65	20 54		0 25	3 10	
130100041102 00		13797 47	2 93	2 51	65 08	34 14	0 00	3 09	
130100010503 00		12523 13	1 29	1 05	43 77	19 36	1 47	3 07	
130100010103 00		5926 44	0 95	0 74	44 32	36 30	0 00	3 02	
130100010101 00		8703 44	0 56	0 53	43 70	78 83	0 00	3 00	
13020102010102 00		15272 06	0 96	0 79	38 30	66 93	3 21	2 95	
130100010702 00		10580 83	3 08	2 18	33 83	47 45	0 26	2 93	
130100011403 00		24105 91	1 45	1 09	39 92	41 10	2 29	2 93	
13010001020104.00		6444 48	0 81	1 07	30 75	43 51	4 67	2 90	
13010002030402.00		2019 36	2 92	2 68	61 39	20 45	0 00	2 88	
130100011005 00		4750 69	0 36	0 55	22 62	71 97	1 92	2 83	
13010002010301 00		4153 77	2 98	2 77	55 43		0 00	2 77	
13010004080104 00		5203 84	3 44	1 93	48 22	18 36	0 00	2 70	
13010001020101.00		5665 12	1 66	1 46	46 30	32 58	0 43	2 65	
13010002050304 00		4915 08	1 94	1 76	74 01	50 60	1 21	2 64	
130100011003 00		5016 35	0 93	0 88	29 64	23 26	2 53	2 58	
130100040204 00		16407 91	1 32	0 75	40 51	76 42	0 00	2 58	
130100020102 00		13807 33	2 85	2 26	64 74	16 07	0 00	2 51	
130100010901 00		18051 03	1 19	1 00	21 08	50 98	2 05	2 48	
130100020203 00		10547 80	1 53	0 82	40 40	32 66	2 18	2 45	
130100010601 00		1562 07	1 24	0 42	27 35	38 45	5 68	2 41	
13010004050102 00		2836 08	6 26	2 13	17 30		0 19	2 32	
13010002030404 00		7526 72	3 70	2 14	49 08	38 85	0 00	2 26	
130100011202 00		4448 46	2 03	1 41	35.07	84 47	1 08	2 22	
1301000104 00		25804 62	0 39	0 52	42 78	12 08	2 29	2 15	
130100020101 00		10617 29	1 97	1 49	53 36	42 04	0 68	2 15	
130100040805 00		6392 90	2 54	1 26	31 70	38 69	0 00	2 04	
130100041101 00		8551 29	1 86	1 75	68 46	15 34	0 00	2 03	
130100011404 00		6201 16	2 17	2 02	75 22	1 74	0 00	2 02	
130100010104 00		16212 30	0 55	0 38	40 91	73 08	0 00	2 00	
130100040701 00		17137 74	0 60	0 25	27 24	25 01	0 00	1 86	
130100010501 00		7743 40	0 87	0 66	22 46	12 13	1 23	1 86	
130100010108 00	Lost Lakes Drainage	8414 44	1 24	1 22	30 36	39 83	0 19	1 80	
130100040904 00		16482 35	2 01	1 21	46 75	6 22	0 11	1 62	
130100011301 00		11514 45	0 99	0 94	51 95	24 06	1 04	1 55	

130100011006 00		10581 86	2 18	1 24	27 60	14 17	0 00	1 52	
130100011401 00		6497 90	1 38	1 21	79 61	29 17	0 00	1 51	
130100041003 00		8949 20	1 63	1 31	61 66	36 56	0 00	1 49	
130100020501 00		24195.46	1 30	1 14	58 59	22 76	0 44	1 44	
13010001020102 00		5910 88	0 44	0 47	36 00	44 33	0 00	1 32	
130100011302 00		7040 36	0 67	0 67	54 80	17 08	0 96	1 29	
130201020102 00		9104 58	0 28	0 41	41 78	29.08	0 00	1 29	
130100020301 00		18719 59	1 48	1 22	47 36	19 05	0 00	1 27	
130100010609 00		11541 94	0 74	0 66	30 51	46 22	0 67	1 27	
130100011306 00	Decker Cr	4272 46	0 63	0 45	47 31	25 76	0 00	1 20	
13010001020201 00		11154 83	0 22	0 31	29 35	33 97	1 12	1 09	
130100011007 00		6267 08	1 25	0 89	41 12	10 26	0 00	0 94	
130100011102 00		10503 20	1 19	0 55	30 68	63 75	0 00	0 93	
130100010701 00		12186 50	0 36	0 29	28 67	56 48	0 18	0 92	
130100010105 00		16643 90	0 43	0 34	50 14	59 47	0 00	0 81	
130100010304 00		7928 15	0 93	0 65	36 31	67 84	0 06	0 72	
130100011308 00		14185 32	0 62	0 48	31 89	71 73	0 00	0 63	
130100011004 00		9080 91	0 12	0 54	25 57	40 33	0 00	0 58	
13010001020103 00		3544 52	0 19	0 21	37 08	40 42	0 00	0 56	
130100010301 00		13921 65	0 24	0 17	43 37	24 28	0 00	0 53	
130100010608 00		9936 87	0 33	0 23	44 75	27 10	0 03	0 45	
130100010611 00		7681 38	0 30	0 19	39 48	83 73	0 13	0 42	
130100010303 00		9267 58	0 17	0 16	36 92	21 38	0 00	0 28	
130100010106 00		25442 18	0 18	0 14	52 08	21 36	0 00	0 22	
130100011002 00		10311 77	0 24	0 19	26 31	24 68	0 00	0 20	
130100010102 00		14960 47	0 27	0 15	38 11	43 49	0 00	0 15	
130100010107 00		6779 96	0 08	0 06	26 93	5 21	0 00	0 11	
130100010302 00		11190 36	0 13	0 09	39 78	0 01	0 00	0 09	



APPENDIX K
Silvicultural Systems, Logging Systems, and Related Effects

APPENDIX K
Silvicultural Systems, Logging Systems, and Related Effects

INTRODUCTION

This appendix begins with information on silvicultural systems and logging systems used on the RGNF It then discusses common effects expected with the use of these silvicultural systems on spruce/fir, mixed conifer, lodgepole pine, and ponderosa pine stands. In addition, a discussion of effects particular to actual harvest operations is included This information is meant to supplement information on Timber Resources found in Chapter 3 of the Environmental Impact Statement (EIS)

SILVICULTURAL SYSTEMS

Silviculture may be defined as the art and science of producing and tending a forest. Classic silvicultural training and application have focused on the specifics of tending forests to produce commercial sawtimber With the current emphasis to move toward ecosystem management, a much broader view of silvicultural options is necessary to sustain biological diversity, protect soil and water resources, and fulfill humankind's material and spiritual needs of the forest environment

A silvicultural system is a combination of interrelated actions by which forests are tended, harvested, and replaced to produce a distinctive form and character Systems are classified as even-aged, two-aged, and uneven-aged.

The silvicultural system used for managing, establishing, and renewing a stand depends on two primary factors. 1) whether a new stand originates from seed or vegetative reproduction (such as aspen clonal suckering), and 2) whether the stand is managed under even-aged or multi-aged conditions (Smith 1986)

An **Even-Aged System** is the combination of actions that results in the creation of stands in which trees of essentially the same age grow together In the strictest sense, the age difference within a stand will normally be within 20 percent of the stand's rotation age. It is common practice among forestry professionals to manage stands as even-aged when all the trees in the stand are essentially the same size and can be managed as an even-aged stand Even-aged stands are characterized by an even forest canopy, with the greatest number of tree stems found in the diameter class (usually expressed in 2-inch classes, such as 8.0"-9 9", 10 0"-11.9") represented by the average diameter of the stand. Also, there are fewer trees in diameter classes both above and below the stand's average diameter

A **Two-Aged System** is the combination of actions that results in stands in which there are two distinct age classes being managed. Two-aged stands are characterized by two distinct layers in the tree canopy The upper layer contributes seed and/or shelter for the younger understory as well as providing the aesthetics of maintaining high forest cover.

An **Uneven-Aged System** is a silvicultural system involving manipulation of a forest to simultaneously maintain 1) continuous high-forest cover, 2) recurring regeneration of desirable species, and 3) the orderly growth and development of trees through a range of diameter or age classes. Uneven-aged stands are characterized by broken and uneven canopies. The largest number of stems are found in the youngest/smallest age class, and the number of stems per age class decreases with increasing age/size, leaving the least number of stems in the oldest/largest age class.

Note that this is a simplified artificial breakdown of a complex resource and that all ranges of age- and size-class distribution can be found naturally in the forest environment, or created through a variety of harvest treatments

Even-aged Silvicultural Systems

The RGNF uses several even-aged systems described below

Clearcutting/patchcutting -- All trees in the stand or area are removed at once. Natural reproduction arises from seed from adjacent stands or trees cut in the clearing operation (e g , lodgepole pine cones from branches of cut trees), or the area may be artificially seeded or planted Patchcuts are small clearcuts, generally ranging from two to ten acres Clearcutting is best suited to species that need full sunlight for optimal growth, such as aspen and lodgepole pine.

Coppice -- *This is a vegetative reproduction method that relies upon sprouting from* existing roots or aboveground stumps All trees in the stand or area are removed at once and the new stand arises from sprouting. The coppice method can only be applied with tree species that have adapted the potential to vigorously sprout new stems after cutting. On the RGNF, both coppice and coppice with standards (defined under uneven-aged methods) are used only in managing aspen stands

Shelterwood -- The stand is removed in a series of harvests that occur over a short period of the rotation Reproduction and accompanying protection come from the partial shelter of seed trees Generally, this method consists of three cuts The preparatory cut removes approximately 1/3 of the overstory. About 10 years later, the seed cut removes another 30-40% of the original overstory, retaining the best seed trees to seed in the site and protect future seedlings from environmental extremes. About 30 years later, the remaining overstory is removed. There are several variations of the shelterwood method They are

Uniform -- applied uniformly across the stand or area,
Strip -- applied in strips across the stand/area,
Group -- applied in groups (patches),
Simulated -- applied where abundant regeneration already exists and the overstory is removed in two or more steps

The shelterwood method is best applied to species needing partial shade for optimal growth (spruce and fir) This method is also applicable on the Forest for some species rated intolerant or intermediate (of shade and root competition) where partial shade is preferred due to poor soil capability, lack of moisture, and harsh climatic conditions (ponderosa pine and Douglas-fir)

Uneven-aged Methods

Single-tree Selection -- This method maintains an uneven-aged structure in the stand by removing individual trees or exceedingly small clumps of trees, allowing regeneration to fill these small openings. This method requires rigorous inventory and control of diameter classes Single-tree selection is best applied with species tolerant of shade and root competition (subalpine fir, and to a lesser degree, Engelmann spruce)

Group Selection -- This method maintains uneven-aged conditions by removing groups of trees in the stand, providing larger openings for regeneration than found in single-tree selection. This method can be diameter class-based or area-based. The maximum diameter of openings created from group selection harvests should not exceed twice the height of the surrounding timber and can be as small as one or two trees (usually range from 0 1-2 0 acres). This method is best applied with species rated tolerant (Engelmann spruce), but can also be used with species rated intermediate to intolerant when larger group openings are prescribed

Neither selection method is recommended in mixed conifer stands that have elevated populations of the western spruce budworm, unless the number of trees per acre are widely spaced Selection methods tend to create ideal habitat for western spruce budworm by maintaining a "laddered" forest canopy (vertically adjacent canopy layers) that enables the defoliating larval stage of the budworm to move horizontally and vertically through the crowns upon which it feeds. Similarly, certain diseases that are readily transmitted from host trees to trees close by can best be controlled by silvicultural methods that open up the stand and reduce the close infection that occurs in more dense stands (For more information on insects and disease, refer to the Insects and Disease section in this Chapter 3 of the EIS)

Two-aged Methods

The Irregular Shelterwood Method and the Coppice-with-Standards Method, with their many variations, are the methods used in the two-aged silvicultural system The step that initiates regeneration is generally made when culmination of mean annual increment (CMAI) of growth has occurred. (CMAI is reached at the age in which the average annual growth is greatest for a stand of trees). Two-aged stands may require one or more intermediate entries for cultural work, commercial thinning, salvage, or sanitation

Irregular Shelterwood Method -- Irregular shelterwood differs from other variants of the shelterwood method in that the shelterwood overstory is retained (i e., final overstory removal cut is delayed or not done at all) beyond the time necessary to regenerate the new stand Such a stand will include two age classes for long periods

and sometimes even for a whole rotation (Smith 1986) This method may be appropriately used when the intent of the treatment is to retain the shelterwood overstory beyond the time necessary to regenerate the stand (when that time exceeds 20% of the rotation age), or when the intent is to perpetuate a two-aged stand structure indefinitely. The term "irregular" refers to the variation in the tree heights within the new stand. As with the standard shelterwood method, irregular shelterwood can be uniformly applied or arranged in strip or group patterns (Smith 1986)

This method includes preparatory cuttings and seed cuttings similar to the even-aged shelterwood method. It differs in the removal cutting sequence in that the removal cuttings may occur later in the rotation or not at all

The removal cut that removes the overstory (older age class) from an understory that was regenerated by the Irregular Shelterwood seed cut results in an even-aged stand which can, in the future, be managed again as a two-aged stand, as an even-aged stand, or as an uneven-aged stand using the appropriate regeneration method.

Coppice-with-Standards -- In this regeneration method, selected overstory trees are reserved as "standards" (the larger, better-formed trees in the stand) at the time when each crop of coppice material is cut. The coppice material is cut using a clearfelling technique or as it is more commonly known, a clearcutting technique The standards " .. are carried on a much longer rotation than the simple coppice beneath them" (Smith 1986) The sprouts and/or seedlings that arise from this regeneration cutting form a distinct story beneath and between the standards

The standards may be either conifer or hardwood On the RGNF, this method has been applied by leaving large Engelmann spruce or Douglas-fir trees as standards in a harvested aspen stand or by leaving small groups (2-3 trees) of mature aspen as standards in a harvested aspen stand

Intermediate Treatments

Cutting treatments, other than those cuttings done to harvest a mature stand, are considered intermediate treatments Such treatments include thinnings, improvement cuts, and sanitation/salvage cuts

Thinnings are prescribed primarily to reduce competition between existing stems in dense stands They may be precommercial (thinnings where trees to be cut are too small to be sold as forest products) or commercial (trees cut are sold for posts, poles, or small sawtimber) Thinnings are generally not prescribed on the RGNF because it is not economical. A possible exception to this is where mixed conifer stands are reflecting moderate to severe defoliation from the western spruce budworm. Thinning the stand is recommended to reduce host habitat, increase predation of the budworm larvae (by thinning, larvae are more likely to drop to the forest floor than onto lower level canopy where they are consumed by ants and other predators), and prevent further loss of forest canopy to concentrated budworm populations

Improvement cuts are cuts made in stands beyond the sapling stage, to improve composition and quality, by removing trees of undesirable species, form, or condition from the main canopy (Smith 1986) Improvement cuts have been prescribed on the Forest where species of low commercial value have been removed to improve growing conditions for valuable commercial species.

Sanitation and salvage cuts are prescribed for stands that are moderately to severely infected, or are at risk to such infection, from insects or disease that can cause death or deformation to commercial trees Sanitation cutting differs from salvage cutting in that sanitation cuts are done to prevent such infections from spreading to healthy stands. These treatments have been widely used on the RGNF -- in Engelmann spruce stands affected by the spruce beetle, in Douglas-fir stands affected by dwarf mistletoe, and in lodgepole pine and ponderosa pine stands affected by the western pine beetle

LOGGING SYSTEMS

There are a variety of logging systems using combinations of equipment and people to accomplish cutting and transporting of trees or logs Logging systems are initially divided into two categories· ground-based and cable The Idaho Jammer (a mobile yarder-loader cable-based system) was used on the RGNF in the 1960's and 70's Since then, no cable-based systems have been used

Ground-based logging systems include horse logging (oxen or mules also used) and mechanical logging Horse logging is mainly used where mechanized logging must be avoided because of environmental concerns It has been rarely used in the past 30 years Ground-based mechanical logging can be broken into three categories whole-tree, tree-length, and cut-to-length.

> **Whole-tree systems** deliver entire trees to landings with limbs and tops attached to the stem. The trees are then limbed and topped at the landing, and cut to lengths for hauling Slash piles are often large Limbs, tops, and defective log segments are burned on site, hauled away for chipping, or chipped and then hauled. On the RGNF, this method has been used with mechanical equipment where residual timber is widely spaced and skidding damage from logs rubbing on standing trees is minimal Logging slash is generally burned at the landing
>
> **Tree-length systems** deliver delimbed and topped tree stems to the landing. Limbs and tops remain at the site of the severed stump As with whole-tree systems, tree-length logging has been allowed on the RGNF where residual timber is widely spaced Limited delimbing and bucking of defective log segments can occur at the landing, but landing slash piles are much smaller than in whole-tree systems.
>
> In **cut-to-length systems**, trees are cut, delimbed, and bucked at the stump before transport to the landing by skidding or forwarding Landing slash piles are small in comparison with other methods

On the RGNF, the most widely used system is a cut-to-length system using chainsaw operators for cutting and track- or wheel-driven skidders for dragging logs to landings This is often called the "conventional" method.

Mechanization of logging equipment has advanced to where all phases of cutting can be accomplished without the use of hand-held chainsaws A distinct advantage of such equipment is greater control of the actual cutting of the tree, by which a boom clamp grasps the tree before cutting and sets the tree down after severing from the stump This greatly reduces damage to residual timber that might otherwise happen with a tree conventionally felled with a chainsaw Advancements in mechanization have also reduced the number of workers required for woods operations, reduced the costs for insurance and workmen's compensation, and increased production rates in the woods This advanced logging machinery is very expensive Ground-based mechanized equipment is limited to slopes less than 40%, smaller-diameter trees, and soils with sufficient bearing strength to support such equipment

COMMON EFFECTS FROM THE APPLICATION OF SILVICULTURAL SYSTEMS

The effects on a timber stand from an applied silvicultural system, or harvest method, will be similar under any alternative allowing that method. Those effects are described by harvest method

Clearcutting/patchcutting

In spruce/fir, Douglas-fir/mixed conifer, and ponderosa pine stands, all merchantable trees (trees greater than or equal to 6-8 inches in diameter) are cut by a timber purchaser. Usually, small (unmerchantable) trees are left to grow as part of the future stand. Many of these trees will show dramatic growth after harvest due to the elimination of competition for water, nutrients, and sunlight by removal of the overstory Additionally, seed will fall from mature trees adjoining the cut area, providing natural regeneration for the future stand

In lodgepole pine and aspen stands, after merchantable trees are cut, the remaining unmerchantable live trees are cut This felling of unmerchantable trees is done by the timber purchaser, as required by the timber sale contract, or by Forest Service or contracted crews With these species, it is necessary to cut all live trees in these harvested areas to ensure the successful regeneration of a new stand.

On the RGNF, most clearcutting is done in small patchcuts, generally less than five acres in size Sharp corners are avoided along patchcut edges to prevent constriction and funnelling of winds into those corners Rounded edges reduce the risk of windthrow of mature timber along these edges Clearcutting results in high fuel loadings from the accumulation of branches, tops, and rotten unmerchantable stems (collectively called logging "slash") Also, clearcutting results in much disturbance of understory vegetation and surface soils (unless harvesting occurs when ground is frozen and/or snow-covered) due to the concentrated movement of skidding machinery and skidded logs throughout the area Clearcut areas reflect a marked edge and contrast between the clearcut unit and adjoining timber Approximately two to five years after harvesting, understory vegetation grows back to again dominate the ground surface In stands containing a mix of tree species, clearcut areas will favor regeneration of species that grow best in open conditions New stands arising from clearcutting will exhibit a single canopy layer and uniform size and age classes

Shelterwood

In the 3-step shelterwood, about two-thirds of the overstory remains after the preparatory cut In spruce/fir stands, there often remains a fully forested appearance after the first cut. The impacts from skidding and slash accumulation are only about one-third that of similarly-sized clearcut areas.

After the seed cut, about one-third of the original overstory remains The seed trees left are generally the tallest, healthiest trees with the fullest crowns These harvested areas appear as highly thinned, open, mature stands. The cumulative effect of both the prep and seed cuts can result in moderate to high accumulations of slash, though in the 10-year period between these cuts, most prep-cut slash has been compressed to the ground by seasonal snow loading

Between the seed cut and overstory removal, the growth of both understory vegetation and newly regenerated trees will dominate the forest floor. About 30 years after the seed cut, the regenerated stand will be of a height and density that the overstory can be removed. Effects from the overstory removal in the way of slash accumulation and ground surface disturbance will be similar to the effect of either the prep or seed cut, except that the new stand may contrast sharply with adjoining pole or sawtimber stands due to short overall height and high density. Nevertheless, a green forested appearance will dominate

The variations of the shelterwood method will have effects similar to the standard (uniform) method, with effects patterned after the variation chosen For instance, effects from the strip shelterwood method will occur in strips, from the group shelterwood in groups or patches In the simulated shelterwood, the future stand is already established beneath the overstory so that there remains a visually evident understory after either prep or seed cuts

Stands arising from shelterwood harvests will exhibit a relatively uniform canopy and similar size and age classes.

Single-tree and Group Selection

In both selection methods, about one-fifth of the overstory is harvested at any one time. Harvesting occurs on a cycle of about every 30 years Compared to even-aged cuts, selection harvests result in lighter cuts over similarly-sized areas, with corresponding lesser impacts on understory vegetation and soils, slash accumulations, and visually Stands harvested with the group selection method will have many scattered small patches cut (averaging one-fourth acre in size) with little or no harvested trees between groups The single-tree selection method will result in scattered trees cut throughout the harvested stand. In both instances, the stand should contain a range of size and age classes and exhibit a fully forested appearance

In the 30-year period between harvests, the small (single-tree or group) openings created will regenerate from seed from adjoining timber and gradually increase in height Species that grow best in partial to heavy shade will be favored over those that grow in more open conditions Unlike even-aged stands, uneven-aged cutting and subsequent growth between harvests results in an uneven or layered forest canopy.

Intermediate Treatments

The effects from thinning are similar to effects from harvesting mature stands, though at a greatly reduced level. In thinnings, smaller trees are cut and removed, and less volume is removed per acre. Intermediate treatments can occur at various stages in a maturing stand Precommenrcial thinnings, sometimes referred to as "weed and release," take place early in a stand's development to remove trees of undesirable species or form, and to open up growing space Commercial thinnings are undertaken once trees reach a size that is commercially valuable, as in posts/poles or small sawtimber

The effects from improvement or sanitation/salvage cuts are similar to those from harvesting mature stands, generally at a reduced level In rare instances, sanitation/salvage cutting effects can simulate those effects from shelterwood cutting, especially when insect epidemics result in high mortality in standing trees

COMMON EFFECTS FROM HARVEST OPERATIONS

In all even-aged methods, removal of the overstory occurs over a limited period relative to the time it takes for a stand to grow from a seedling stage to a fully-sized tree stage. The effects on a clearcut stand from actual harvest operations (e.g., felling, skidding) occur only one time in the life of a stand In the 3-step shelterwood, harvest operations occur three times during the life of a stand, in 2-step shelterwood, only two times. An example could be a spruce/fir stand managed on a 180-year rotation with a 3-step shelterwood The prep cut occurs at year 0, the seed cut at year 10, and the overstory removal cut at year 40 After the overstory removal cut, this stand would not be entered again for harvest until year 180, leaving the area 140 years without harvest-related disturbance

In uneven-aged methods, removal of the overstory occurs periodically On the RGNF, the average 30-year cutting cycle will result in harvest equipment entering the stand every 30 years Hence, selection methods result in about 2-3 times more entries during a comparable period of time compared to shelterwood methods Additionally, due to the recurring entries into a stand with harvest equipment, it is preferable to use the same skid trails and landings with each entry So, once skid trail and landing locations are agreed upon with the first entry, those locations become committed to those purposes for as long as that stand is managed under uneven-aged methods In contrast, after the final harvest of an even-aged method has occurred (clearcut, or overstory removal of shelterwood), skid trail and landing areas become available for forest regeneration and growth.

Though intermediate treatments/harvests can occur at various stages of development in even- or uneven-aged stands, generally the impact is greatly reduced over that of regeneration harvests On the RGNF, thinnings are often prescribed for lodgepole pine stands and accomplished through administration of small sales of posts and poles

In ground-based harvest systems, the harvest operation involves several key steps. cutting, skidding, decking, loading, and hauling. Cutting includes cutting of the tree, cutting the tree into logs (bucking), and removal of limbs, tops, and defective portions (rotten, twisted, crooked, deeply cracked) from the merchantable logs. Skidding is the transport of logs to a gathering point, or landing, where logs are pushed together and stacked into decks Then

logs are loaded onto trucks for removal (hauling) from the sale area (Some harvest systems remove limbs/tops/defect at the landing).

The cutting of standing trees (or felling) can damage overstory and understory vegetation. Damage to residual timber from chain saw felling varies greatly depending upon the ability of the chainsaw operator (or faller), weather (e g , trees are more brittle and prone to breakage in cold weather; winds can affect felling direction), and conditions of the tree and stand. A falling tree can damage other live trees by stripping branches, breaking tree tops, stripping protective bark, or striking and knocking down trees Felling with mechanized equipment results in minimal damage to residual timber because of the control provided by booms that grasp, cut, and lower trees Residual timber damage from felling is generally greater in dense stands than open stands due to constricted operating space Similarly, skidding damage is generally greater in dense stands This damage is usually limited to the stripping of bark due to skidded logs rubbing against standing trees. In most spruce/fir stands, and in some Douglas-fir/mixed conifer stands, first-entry harvests require additional cutting of merchantable and unmerchantable trees for skid trails to allow skidding operations to occur Without such cutting for skid trails in dense stands, there would be greater damage to residual timber.

Logs are decked at landings, adjoining roads Depending on road layout and terrain features, landings can vary greatly in number and size Small openings or areas of low tree density are favored for landing sites Landings often require additional felling of trees to provide operable space. Due to repeated skidding to, decking at, and loading from landing sites, most vegetation is completely disturbed from landing-associated traffic.

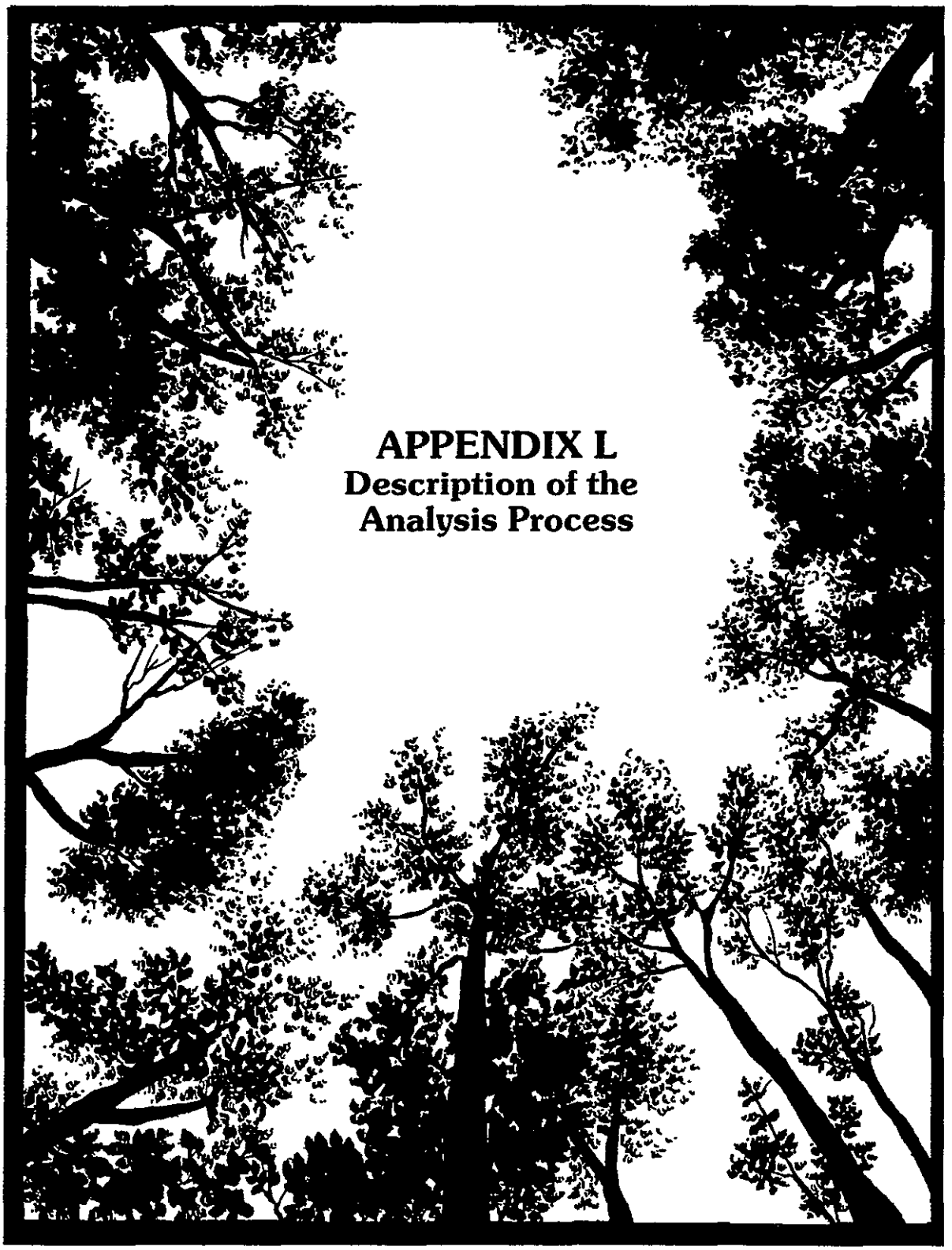
Newly proposed OSHA (Occupational Safety and Health Administration) regulations would require all "hazard" trees, standing within two tree lengths of areas where logging personnel are working, to be felled. In clearcut areas, unmerchantable trees will often be felled or knocked down due to the concentrated harvesting in these areas. In partial-cut areas, many unmerchantable trees are not damaged from harvest operations. Depending on how strictly these OSHA regulations are interpreted and enforced, and how trees are judged as hazardous, many large unmerchantable trees, both live and dead, may need to be cut to ensure safe operations

Standing dead (or snags) will be reduced in numbers in harvested areas from intentional cutting (i.e., prescribed for harvest, cut for safety, or cleared in skid trails, landings, or roads) and unintentional damage resulting in such trees knocked down and/or cut

In all ground-based harvest systems, there is some accumulation of logging slash at the landing In whole-tree systems, much of the logging slash accumulates at the landing In tree-length or cut-to-length systems, most logging slash is left at or near the cut stump. In most harvest areas on the RGNF, there occurs substantial accumulations of slash at landings to spur piling and burning Slash at the landing is generally piled by the timber purchaser after all merchantable logs are removed from the area If the sale area is remote and/or demand for fuelwood is low, slash burning is done by the purchaser. More often, this slash is made available to the public after the timber sale is completed Slash remaining after fuelwood gathering is later burned by Forest crews

For cut logs to reach sawmills, there must be road access to timber sale areas. In areas of inadequate access, the construction of new roads results in the removal of the land within the road prism from tree production.

When a timber purchaser has cut and removed all timber prescribed for harvest from a sale unit or area, the purchaser is required to perform a variety of restoration activities, collectively referred to as "cleanup " This includes felling of damaged trees (and removal of merchantable logs), cutting of slash so it lies close to the ground (usually within two feet), construction of water diverting ditches on skid trails (termed "waterbars"), and general leveling and grading of landings and roadways In-sale roads (spur roads built primarily for accessing timber stands and not meant for other resource access) are closed with gates or other physical barriers to prevent further disturbance The final task is seeding, with fast-growing grasses and forbs, of highly disturbed areas (landings, in-sale roads, cut banks, road closure barrier mounds).



APPENDIX L
Description of the Analysis Process

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INTRODUCTION

This appendix describes the analysis process and techniques used by the interdisciplinary team during the Forest Plan Revision It contains a framework of the planning process and a discussion of the various analytical tools used.

The planning problem is a very complex one This complexity stems from the need to address a variety of interrelated and often conflicting issues by allocating land and scheduling activities in a cost-efficient manner for the entire Forest over a long period of time This appendix describes some of the analytical tools used to reduce the process to manageable proportions.

FRAMEWORK OF THE PLANNING PROCESS

The revision of a Forest Plan is guided by the general planning process as described in 36 CFR 219 12 This section describes ten steps, which lead from the completion of a Forest Plan to the completion of a revised Forest Plan.

Step 10. Monitoring and Evaluation (Step 10 of the Initial Planning Process).

The last step of the initial Forest Plan (1985) process is the first step in revising a Forest Plan Annual monitoring and evaluation has been done since the first Forest Plan was released in 1985. These monitoring reports have helped the Forest Supervisor identify several reasons to revise the Forest Plan

Step 1. Identification of Purpose and Need

After the Forest Supervisor determined that a revision was needed, a series of public meetings were organized At these meetings, the public was encouraged to comment on possible areas in the Forest Plan which needed revision Local government officials were also involved at this stage

The feedback was screened into six possible categories of action: (1)Topics which required a Plan revision, (2) minor items which could be addressed with a Plan amendment, (3) implementation concerns which needed to be address via the budget or forest priorities, (4) topics which needed legislative action, (5) topics where other governmental entities had

jurisdiction, or (5) topics where no decision could be made until some more research could be performed.

As a result of this planning action, the Regional Forester decided in April 1993 that there were five topics for the Forest Plan Revision as described in Chapter 1 of the DEIS (1) Ecosystem Management, (2) Timber suitability and management, (3) Wilderness and Other special Area considerations, (4) Recreation Opportunities and Travel Management, (5) Oil and Gas Leasing

As the planning process continued, other changes not specifically related to the five major topics have also been considered However, the revision topics have become the primary focus of the Forest Plan Revision effort.

Step 2. Planning Criteria.

During this step, the remainder of the process is outlined. As the Proposed Revised Forest Plan was being prepared, several mid-course corrections were necessary, as analysis models were revamped, dismissed or newly developed, or suggestions were made by the public to add more items to consider. For these reasons, completion of the Proposed Revised Forest Plan has taken longer than originally estimated.

Step 3. Inventory Data and Information Collection.

The primary source of data used during the revision process was the Rocky Mountain Resource Information System (RMRIS) The type of data and information needed for the revision process was based on the revision topics (the issues, concerns and opportunities) The data was collected and assembled in a manner meaningful for answering planning problems, as discussed later in this appendix

Step 4. Analysis of the Management Situation (AMS)

This step determines the current level of goods and services coming from the Forest in relationship to society's demands It provides background information for formulating a broad range of reasonable alternatives The July 1994 AMS document focused on the revision topics, and several of the models described in this appendix were initially developed during this step Much of the work originally completed for the AMS has been redone and is incorporated into the DEIS and FEIS.

Step 5. Formulation of Alternatives.

Some initial ideas for alternatives were developed and discussed in the AMS These were further formulated by the interdisciplinary team in accordance to NEPA procedures Broad themes were developed to respond to the revision topics.

An in-depth review of the goals, objectives, standards, and guidelines of the existing Forest Plan was made, and possible changes were identified. Additional changes were identified

by the Rocky Mountain Region Office to provide consistency across the Region These changes were packaged together into compatible sets

The alternatives were presented to the public at a series of open houses during November and December of 1993. These meetings spanned southern Colorado and northern New Mexico, from Boulder to Chama, from Durango to Antonito comments from the pubic and local government officials were solicited. After reviewing the comments, the alternatives were further refined into the set that appears in the EIS

Step 6. Estimated Effects of Alternatives.

The physical, biological, economic, and social effects of implementing each alternative considered in detail were estimated and compared according to NEPA procedures.

Step 7. Evaluation of Alternatives.

Significant physical, biological, economic and social effects of implementing alternatives were evaluated

Step 8. Preferred Alternative Recommendation.

The Forest Supervisor, along with the entire Forest Leadership Team, reviewed the interdisciplinary team's evaluation and recommended a preferred alternative to the Regional Forester The Regional Forester selected the preferred alternative, which was presented in the DEIS/Revised Plan and released to the public for review and comment on December 7, 1995.

Step 9. Plan Approval and Implementation.
Based on public and agency comments of the DEIS/Plan, a new alternative was developed There were also several changes made to the effects analysis of all alternatives, as well as changes to the various portions of the Plan With release of this Plan and FEIS, the Regional Forester has made a decision for the implementation of the Forest Plan.

ANALYTICAL TOOLS USED

Forest Planning Model (FORPLAN)

FORPLAN is a computerized linear programming (LP) model which chooses among alternative activities given a set of constraints and an objective such as maximizing income or maximizing timber volume Although FORPLAN is a standardized model used by all National Forests in the development of Forest Plans, there is no standard way of using the model The tool is flexible and can be adopted to the needs of each individual planning problem

For the Rio Grande, FORPLAN was used as a timber-harvest scheduling tool, reporting timber outputs, timber costs and benefits, while also tracking vegetation growth and wildlife habitat structural stages FORPLAN was not used to make land allocation decisions. Those decisions were made first, and the acres assigned to each management area were transferred to the model Given what the management emphasis should be, the choices available in the model involved what type of timber harvest should be done and when

FORPLAN was used to schedule timber harvests by decade for 20 decades. This long planning horizon assures a sustainable yield well into the future. The model was also designed to calculate the ASQ for softwoods and hardwoods separately so that a Noninterchangeable Component (NIC) could be used

The version of FORPLAN used for the EIS was FORPLAN Version 2, Release 14 It was run on 486 and P6 personal computers FORPLAN is a Forest Service program that builds a matrix of coefficients and transfers the file to a commercial linear programming package called C-WHIZ.. After C-WHIZ solves the problem, the FORPLAN program takes the C-WHIZ output, writes a report and produces Paradox data files containing the results.

FORPLAN Analysis Areas

The basic decision unit in the FORPLAN model is the analysis area FORPLAN selects one or more activities for each analysis area The Forest was stratified into analysis areas according to six groupings (level identifiers)· watersheds, scenic condition, roaded character, species, timber stratification (size class/density/harvest condition), and management area prescription.

Acreage calculations

The acreages for each analysis area have been changed from the DEIS Since the development of the DEIS, the Forest has coverted its GIS system from MOSS to ARC This conversion has allowed better and more thorough analysis of impacts During the past year the Forest has started using ARC acreages for each RMRIS site This has changed the amount of Forest acreages

The RMRIS site acreages do not consider the affect roads have on the base vegetative acreage GIS was used to calculate the area in road prisms by buffering all roads using the average permanent prism width for each road class The buffered road system was overlayed with the RMRIS coverage to determine the impacts of roads on the forested acreages From this procedure, it was found that of the 25,000 acres of roads, approximately 12,200 acres of roads were within forested RMRIS sites Further work reveals that 9,940 acres of roads were within Tentatively Suitable Timber Lands(TSTL)

Riparian lands on the Forest are approximately 129,400 acres (123,238 mapped, the remaining calculated by stream order) Of the mapped riparian areas, 45,600 acres are within forested RMRIS sites and 29,400 acres are with TSTL. Since riparian areas need special consideration, the IDT determined that they should be removed from the scheduled and suitable landbase Over the years many of the forest roads have been built to follow stream courses and are close to or within riparian areas. With this information, the GIS was used to combine the buffered roads coverage with the riparian coverage to determine total acreage impact This methodology determined that only 1.6% of the buffered roads were within the mapped riparian areas.

The combined affect of roads and riparian areas on forested RMRIS sites is 54,400 acres, and 38,342 acres within TSTL

FORPLAN Analysis Areas (Level Identifiers)
The following is a detailed breakdown of each group and the codes used in FORPLAN

LEVEL 1 **WATERSHEDS**
These 41 areas are a combination of Th, 5th, Th, and Th level watersheds
The level used is due to disturbance analysis and expected activities
Dispersion of timber harvest activities was based on Th level watersheds

```
*LEVEL 1        WATERSHEDS
  AA     URGA  13010001            TH LEVEL
  AB     URGB  130100010201        TH
  AC     URGC  1301000105          5TH
  AD     URGD  130100010607        6TH
  AE     URGE  130100010601/02/04  6TH LEVELS COMBINED
  AF     URGF  130100010603        6TH - WORKMAN CRK
  AG     URGG  1301000112          5TH
  AH     URGH  130100011303        6TH - PASS CRK
  AI     URGI  130100011305        6TH
  AJ     URGJ  13010001130501      7TH - UPPER PARK CRK
  AK     URGK  130100011103        6TH - RIO GRANDE COMPOSITE
  AL     URGL  130100011307        6TH
  AM     URGM  13010001130703      7TH - CROSS CRK
  AN     URGN  130100011304/06     6TH - COMBINED
  AO     URGO  130100011301/02     6TH - COMBINED
  AP     URGP  130100011201        6TH - ALDER CRK
  BA     LRGA  13010002            4TH - LOWER RIO GRANDE
  BB     LRGB  1301000201/02       5TH - COMBINED
  BC     LRGC  130100020401        6TH
  BD     LRGD  130100020501        6TH
  CA     SLCA  13010003            4TH LEVEL - SAN LUIS CRK
  CB     SLCB  1301000302          5TH
  CC     SLCC  13010003020106      6TH - SLAUGHTERHOUSE CRK
  DA     SAGA  13010004            4TH - SAGUACHE CRK WATERSHED
  DB     SAGB  13010004010307      7TH - SAGUACHE CR UNNAMED TRIB
  DC     SAGC  1301000402          5TH
  DD     SAGD  130100040202        6TH - SAGUACHE CRK
  DE     SAGE  1301000403          5TH
  DF     SAGF  1301000404          5TH
  DG     SAGG  1301000406          5TH
  DH     SAGH  1301000407          5TH
  DI     SAGI  1301000409          5TH
  DJ     SAGJ  13010004090103      7TH - MINERS CRK
  DK     SAGK  13010004090106      7TH - CAVE CRK
  DL     SAGL  1301000410          5TH
  DM     SAGM  13010004100201      7TH - PERRY CRK
  EA     CONA  13010005            4TH - CONEJOS RIVER WATERSHED
  EB     CONB  130100050104/05     6TH - COMBINED
  EC     CONC  130100050302        6TH
  ED     COND  130100050501/02/03  6TH - 3 COMBINED
  FA     CHAMA 13020102            4TH - CHAMA BASIN
*AGGREGATE LEVEL1
  A1     UPRRG*UPPER RIO GRANDE- 4TH LEVEL WATERSHED
         AA AB AC AD AE AF AG AH AI AJ
         AK AL AM AN AO AP
  B1     LWRRG*LOWER PORTION RIO GRANDE- 4TH LEVEL WATERSHED
         BA BB BC BD
  C1     SLUIS*SAN LUIS CRK - 4TH LEVEL WATERSHED
         CA CB CC
```

```
  D1    SAGCR*SAGUACHE CRK - 4TH LEVEL WATERSHED
        DA DB DC DD DE DF DG DH DI DJ
        DK DL DM
  E1    CONEJ*CONEJOS RIVER - 4TH LEVEL WATERSHED
        EA EB EC ED
```

LEVEL 2 **SCENIC QUALITY OBJECTIVES.**
SQO's are used only on suitable timber lands for the application of SCO constraints

```
*LEVEL2       SCENIC QUALITY
  VH    VRYHGH* VERY HIGH
  HG    JSTHST* HIGH
  MD    MODERT* MODERATE
  LW    JSTLOW* LOW
  NS    NOSCNC* NO SQO'S APPLIED
```

LEVEL 3 **TIMBER COMPONENT/ROADED CHARACTER.**
Timber Component is related to RIS Database coding of each site. This was used primarily for suitable and roaded nature of each analysis area

```
*LEVEL3       TIMBER COMPONENT
  01    RDLS01* ROADLESS AREA 020901
  03    RDLS03* ROADLESS AREA 020903
  06    RDLS06* ROADLESS AREA 020906
  07    RDLS07* ROADLESS AREA 020907
  11    RDLS11* ROADLESS AREA 020911
  12    RDLS12* ROADLESS AREA 020912
  13    RDLS13* ROADLESS AREA 020913
  14    RDLS14* ROADLESS AREA 020914
  20    RDLS20* ROADLESS AREA 020920
  23    RDLS23* ROADLESS AREA 020923
  25    RDLS25* ROADLESS AREA 020925
  31    RDLS31* ROADLESS AREA 020931
  46    RDLS46* ROADLESS AREA 020946
  48    RDLS48* ROADLESS AREA 020948
  49    RDLS49* ROADLESS AREA 020949
  50    RDLS50* ROADLESS AREA 020950
  51    RDLS51* ROADLESS AREA 020951
  54    RDLS54* ROADLESS AREA 020954
  55    RDLS55* ROADLESS AREA 020955
  56    RDLS56* ROADLESS AREA 020956
  57    RDLS57* ROADLESS AREA 020957
  59    RDLS59* ROADLESS AREA 020959
  60    RDLS60* ROADLESS AREA 020960
  61    RDLS61* ROADLESS AREA 020961
  64    RDLS64* ROADLESS AREA 020964
  75    RDLS75* ROADLESS AREA 020975
  78    RDLS78* ROADLESS AREA 020978
  A2    RDLSA2* ROADLESS AREA 0209A2
  A5    RDLSA5* ROADLESS AREA 0209A5
  A7    RDLSA7* ROADLESS AREA 0209A7
  A8    RDLSA8* ROADLESS AREA 0209A8
  A9    RDLSA9* ROADLESS AREA 0209A9
  B3    RDLSB3* ROADLESS AREA 0209B3
  B8    RDLSB8* ROADLESS AREA 0209B8
  B9    RDLSB9* ROADLESS AREA 0209B9
  C2    RDLSC2* ROADLESS AREA 0209C2
  C3    RDLSC3* ROADLESS AREA 0209C3
  C4    RDLSC4* ROADLESS AREA 0209C4
```

```
  C5     RDLSC5* ROADLESS AREA 0209C5
  C6     RDLSC6* ROADLESS AREA 0209C6
  C7     RDLSC7* ROADLESS AREA 0209C7
  C8     RDLSC8* ROADLESS AREA 0209C8
  DA     RDLSDA* ROADLESS AREA 0209DA
  DE     RDLSDE* ROADLESS AREA 0209DE
  DI     RDLSDI* ROADLESS AREA 0209DI
  M1     RDLSM1* ROADLESS AREA 0209M1
  M2     RDLSM2* ROADLESS AREA 0209M2
  M3     RDLSM3* ROADLESS AREA 0209M3
  P1     RDLSP1* ROADLESS AREA 0209P1
  Q2     RDLSQ2* ROADLESS AREA 0209Q2
  Q3     RDLSQ3* ROADLESS AREA 0209Q3
  RA     RDLSRA* ROADLESS AREA 0209RA
  RE     RDLSRE* ROADLESS AREA 0209RE
  RR     RDLSNT* ROADLESS AREAS - NONTIMBER EMPHASIS 5000+
  SN     NTSUIT* NONTENTATIVE SUITABLE LANDS - TC 900,710,720,310,NFL
  SU     SUITRD* SUITABLE LANDS - ROADED - MAINTAINENCE/RECONSTRUCTION COSTS
  UL     NRDLOW* UNROADED AREAS - ROAD CONSTRUCTION COSTS 0-500
  UD     UNDEVP* UNDEVELOPED LANDS - NO COLLECTOR NECESSARY 500-5000
  UU     UNRDNT* UNROADED AREAS - NONTIMBER EMPHASIS 0-500
*AGGREGATE LEVEL3
  TS     SUITAB  ALL SUITABLE LANDS
         01 03 06 07 14 20 31 46 48 51
         54 56 57 59 60 75 A2 A7 A8 A9
         B3 B8 B9 C6 DA DE DI M1 M2 M3
         11 12 13 23 25 49 50 55 61 64
         78 A5 C2 C3 C4 C5 C7 C8 P1 RA
         Q2 Q3 RE RR UL UD UU SU
  UR     SUUNRD* SUITABLE - UNROADED
         01 03 06 07 14 20 31 46 48 51
         54 56 57 59 60 75 A2 A7 A8 A9
         B3 B8 B9 C6 DA DE DI M1 M2 M3
         11 12 13 23 25 49 50 55 61 64
         78 A5 C2 C3 C4 C5 C7 C8 P1 RA
         Q2 Q3 RE RR UL UD UU
  RL     RDLSAR* ROADLESS AREAS
         01 03 06 07 14 20 31 46 48 51
         54 56 57 59 60 75 A2 A7 A8 A9
         B3 B8 B9 C6 DA DE DI M1 M2 M3
         Q2 Q3 RR
  UA     UNDADJ*  UNDEVELOPED AREAS ADJACENT
         11 12 13 23 25 49 50 55 61 64
         78 A5 C2 C3 C4 C5 C7 C8 P1 RA
         RE
```

LEVEL 4 FORESTED COVER TYPES.

```
*LEVEL4        SPECIES
  AS     ASPEN** ASPEN COVER TYPE
  SF     SPRFIR* ENGELMANN SPRUCE/SUBALPINE FIR COVER TYPE
  DF     DOUGFR* DOUGLAS FIR COVER TYPE
  PP     PONDPN* PONDEROSA PINE COVER TYPE
  LP     LODGEP* LODGEPOLE PINE COVER TYPE
  NF     NON4ST* NONFORESTED - GRASS/FORB/SHRUB/NONVEG/NONCOMM
*AGGREGATE LEVEL4
  SW     SOFTWD* SOFTWOOD COMMERCIAL
         SF DF PP LP
  HW     HARDWD* HARDWOOD - COMMERCIAL
         AS
```

LEVEL 5 **TIMBER STRATIFICATION.**

This was based on statistical work which examined various significant volume differences Differences were mainly size class, density, district (different avg. site index on Saguache RD), and previous harvest activity (if any)

```
*LEVEL5        TIMBER STRATA
  RG     REGEN    REGEN
  7U     7UNCT0*  SEED/SAP, UNCUT, AMD 0 - 130
  81     8SHWD0*  POLES, 1STEP SHELTERWOOD, AMD 0-130
  8U     8UNCT0*  POLES, UNCUT, AMD 0-130
  8A     8UNCTA*  POLES, UNCUT, AMD A = 0-40
  8B     8UNCTB*  POLES, UNCUT, AMD B = 41-60
  8C     8UNCTC*  POLES, UNCUT, AMD C = 61+
  8M     81SWDA*  POLES, 1STEP, AMD A
  8N     81SWDB*  POLES, 1STEP, AMD B
  8O     81SWDC*  POLES, 1STEP, AMD C
  9U     9UNCT0*  SAWTIMBER, UNCUT, AMD 0-130
  91     91SWD0*  SAWTIMBER, 1STEP, AMD 0-130
  9A     9UNCTA*  SAWTIMBER, UNCUT, AMD 0-40
  9B     9UNCTB*  SAWTIMBER, UNCUT, AMD 41-60
  9C     9UNCTC*  SAWTIMBER, UNCUT, AMD 60+
  9M     91SWDA*  SAWTIMBER, 1STEP, AMD A
  9N     91SWDB*  SAWTIMBER, 1STEP, AMD B
  9O     91SWDC*  SAWTIMBER, 1STEP, AMD C
  9X     9SALVB*  SAWTIMBER, SALVAGE, AMD B
  9Y     9SALVC*  SAWTIMBER, SALVAGE, AMD C
  9Z     92SWDA*  SAWTIMBER, 2STEP, AMD A
  9D     9UNCAS*  SAWTIMBER, UNCUT, AMD 0-40 SAGUACHE
  9E     9UNCBS*  SAWTIMBER, UNCUT, AMD 41-60 SAGUACHE
  9F     9UNCCS*  SAWTIMBER, UNCUT, AMD 60+ SAGUACHE
  9P     91SWAS*  SAWTIMBER, 1STEP, AMD A SAGUACHE
  9Q     91SWBS*  SAWTIMBER, 1STEP, AMD B SAGUACHE
  9R     91SWCS*  SAWTIMBER, 1STEP, AMD C SAGUACHE
*AGGREGATE LEVEL5
  SL     SELECTION
         8U 9U 7U 8A 8B 8C 9A 9B 9C
         9E 9F 9X 9Y 9D
  SW     SHELTERWOOD
         81 8M 8N 8O 91 9M 9N 9O
         9Z 9P 9Q 9R
  SG     SAGUACHE
         9D 9E 9F 9P 9Q 9R
  OF     EVERYTHING ELSE
         7U 81 8U 8A 8B 8C 8M 8N 8O 9U
         91 9A 9B 9C 9M 9N 9O 9X 9Y 9Z
         RG
C*
C*       AA WAS CREATED CAUSE 9D CAN'T DO GROUP SELECTION
C*
  AA     NOT 9D
         8U 9U 7U 8A 8B 8C 9A 9B 9C
         9E 9F 9X 9Y
```

LEVEL 6 **FOREST MANAGEMENT PRECRIPTIONS.**

The management prescriptions were allocated via the IDT, with public input This is predetermined, the model will not allocate.

```
  1N     BCKNMT* 1 31 BACKCOUNTRY NONMOTORIZED
  3A     ASPMGT* 3 56 ASPEN MANAGEMENT
  3M     BCKMOT* 3 31 BACKCOUNTRY MOTORIZED
  33     BCKCNT* 3 3  BACKCOUNTRY-G
  42     SCENIC* 4.21 SCENIC BYWAYS
```

```
  43    DISREC* 4.3  DISPERSED RECREATION
  5R    BGGAME* 5.41 BIG GAME WINTER RANGE
  5G    GEN4ST* 5 11 GENERAL FOREST & RANGE LANDS
  5F    4STPRD* 5 13 FOREST PRODUCTS
  5W    H20YLD* 5.21 WATER YIELD AREA
  5S    SWAREA* 5.42 BIGHORN SPECIAL WILDLIFE AREA
  UN    UNAVBL* UNAVAILABLE FOR TIMBER HARVEST
  NS    NONSUT  NONSUITABLE LANDS
*AGGREGATE LEVEL6
  TM    TBRMGT* AREAS IN SUITABLE BASE ALLOWING HARVEST
        3A 42 43 5G 5F 5R 5W
  NC    NOCUT** NO CUTTING RXS
        UN 1N 3M 5S NS 33
  TP    PRIMTIM... .PRIMARY TIMBER
        5G 5F
  TS    SECTIM. . . SECONDARY TIMBER
        42 43 5R 5W
```

Allocation Decisions

The FORPLAN model was allowed to make two major allocation decisions. The first was whether to place analysis areas to either a nonharvest or timber harvesting allocation. If allocated to timber harvesting, then the model had to select some type of treatment for the analysis area The following two groupings illustrate the level identifier used:

LEVEL 7 **MANAGEMENT ALLOCATION.**
This set up for Zone/CAC allocations

```
*LEVEL7       MGMT ALLOCATION
  TM    TBRMGT* TIMBER MGMT ..CUTTING
  NH    NONHRV* NO HARVESTING. .MIN MGMT
*AGGREGATE LEVEL7
  TH    BOTHTH* EITHER TIMBER HARVEST OR NOT
        TM NH
```

LEVEL 8 **MANAGEMENT TREATMENT.**
These are the various harvest system options.

```
  3S    3SSW*** SHELTERWOOD - SHELTERWOOD - 3 STEP - ALL CUTS TO BE DONE
  2S    2SSW*** 2STEPSHLTWD - 2 STEP SHELTERWOOD ...ALL CUTS TO BE DONE
  3I    3SSWIR* 3STEPIRRSWD - 3 STEP SHELTERWOOD -- IRREGULAR CUTTING
  2I    2SSWIR* 2STEPIRRSHD - 2 STEP SHELTERWOOD -- IRREGULAR CUTTING
  T1    INDTR1* INDIVIDUAL TREE SELECTION.  .1ST DECADE START
  T2    INDTR2* INDIVIDUAL TREE SELECTION ...2ND DECADE START
  T3    INDTR3* INDIVIDUAL TREE SELECTION....3RD DECADE START
  G1    GROUP1* GROUP SELECTION ..1ST DECADE
  G2    GROUP2* GROUP SELECTION...2ND DECADE
  G3    GROUP3* GROUP SELECTION...3RD DECADE
  CC    CLRCUT* CLEAR CUT
  PC    PATCHC* PATCH CLEAR CUTS - SMALL AREA
  NH    NOHARV* NO HARVESTING
*AGGREGATE LEVEL8
  HR    HARVST* HARVESTING
        2I 2S 3S 3I T1 T2 T3 G1 G2
        G3 CC PC
  SH    SHLTWD* SHELTERWOOD ... 2 & 3 STEP
        2I 2S 3S 3I
  CS    CC&SH** CLEARCUTTING AND SHELTERWOOD
        3S 2I 2S 3I CC PC
  SL    SELECTION
        G1 G2 G3 T1 T2 T3
```

Revenues and Costs used in the FORPLAN Model

FORPLAN was constructed as a timber-harvest scheduling model, therefore only revenues and costs pertaining to the timber program were included in the model Thus, present net value (PNV) calculations in the model pertain only to timber

Timber revenues values in the Region are calculated by the Regional Economist using actual harvest (cut) values from TSPIRS TPIR 02 Reports, using a 3-year average for revenues, purchaser credit, and harvest volume data Using this methodology, confer revenues were $150/mbf and aspen revenues were set at $56/mbf

Revenue trends were also examined A review of revenue trends for each forest in the region found that revenues have dropped on most forests. Revenues on the RGNF have, however, increased.

After further literature review, it was decided to use the RPA report. RPA has estimated that softwood prices will experience a real-price increase of 2% per year during the next five decades in the Rocky Mountain area. The predictions for hardwood show no real-price increases The revenue trend area of FORPLAN was set-up to allow the 2% increase in softwood revenues for periods 1-5. Revenue trends increases for periods 6-20 were not used

The tables M-1 and M-2 summarize the costs used in FORPLAN and any special relationship used

Table M-1.
Transportation System Costs & Production Relationships Used in FORPLAN

Cost Item	Roadless Areas (Zones)		Unroaded(UR)		Roaded (SU)	
	Initial	Reentry	Initial	Reentry	Initial	Reentry
COLLECTORS						
PCOL - Pre Eng Collector	$15,000/mi	NA	NA	NA	NA	NA
ECOL - Eng Collector	$5,600/mi	NA	NA	NA	NA	NA
COLL- Collector Const	$50,000/mi	NA	NA	NA	NA	NA
Local/temp						
JL25 - Prism	$1,000/mi 001/ac	NA	$1,000/mi 001/ac	NA	NA	NA
L214 - Pre-Eng	$8,900/mi 004/ac	NA	$8,900/mi 004/ac	NA	NA	NA
LT22- Const Eng	$5,600/mi 004/ac	NA	$5,600/mi 004/ac	NA	NA	NA
RDC - Rd Credit - Const	$16,000/mi 004/ac	NA	$16,000/mi 004/ac	NA	NA	NA
Reconstruction/Maintenance						
L223- Eng - Mntc/Recons	NA	$4,000/mi 001/ac	NA	$4,000/mi 001/ac	$4,000/mi 001/ac	$4,000/mi 001/ac
RDR - Rd Credit- Reconst	NA	$13,000/mi 001/ac	NA	$13,000/mi 001/ac	$13,000/mi 001/ac	$13,000/mi 001/ac

Table M-2.
FORPLAN Activities and Costs

FORPLAN Code	FORPLAN Description	Cost/ Unit	Production Relationship	TSPIRS Description
ET12	ET12 TIM PURPOSE ADMN-CC/PC -Shwd/GS - ITS	$53 70/Ac $67 15/Ac $134 30/Ac	1Ac Admin/1Ac Harv	Harvest Admin - Timber Purpose
TGA	TG4 GEN ADMIN FIXED	$56 50/Ac	1Ac Admin/1Ac Harv	Gen Admin Fixed
E114	ET114TIM SALE PREP -CC/PC - Shwd/GS - ITS	$74 90/Ac $83 20/Ac $249 60/Ac	1Ac prep/1Ac Harv	Timber Sale Prep
E141	ET1141 ANALYSIS/DOC	$37 90/Ac	1/1Ac Harv	Analysis/Documentation
E171	ET171Timber Program Appeals/Litigation	$1 25/Ac	1/1Ac Harv	Timber Program Appeals
PFBD	PF BRUSH DISPOSAL	$0 90/mbf	1/1mbf Harv	Brush Disposal
LT23	LT23COOP RD MNTCE	$1 40/mbf	1/1mbf Harv	COOP Road Maintenance
E112	ET112TIM RES PLANNING	$9 55/Ac	1/1Ac Harv	Timber Res Planning
E111	ET111TIMB INV & EXAMS -CC/PC - Shwd/GS - ITS	$13 95/Ac $9 30/Ac $27 90/Ac	1/1Ac Harv	Timber Inv & Exams
ETRK	ET24XREFORESTATION	$103/Ac	5Ac/100Ac Harvested	Reforestation - KV
ETRA	ET24 Reforestation-Appropriated	$166/Ac	1Ac/100 Ac Harvested	Reforestation - Appropriated
ETTA	ET25-TSI Appropriated	$103/Ac	1Ac/200Ac Harvested	TSI Appropriated
ETTK	ET25XTIM TSI-KV	$164 45/ac	4Ac/100Ac Harvested	TSI-KV
DEIS	EIS for Unroaded Adj to Wilderness	$150,100/Area	1 / area	
BEIS	EIS for Roadless area	$300,000/Area	1/ area	

FORPLAN Economic Analysis (Stage II)

A Stage II analysis was run to estimate the most profitable prescription for each analysis "Stage II" refers to the second stage in the NFMA regulations in determining timber land suitability (36 CFR 219 14(b)) and is not associated with Stage II timber inventory procedures

The analysis consists of sorting through economic information that is generated for use in FORPLAN and finding the highest present net value for each part of the Forest. The analysis was done by taking data from the FORPLAN MATRIX RX file and placing it in a PARADOX database Stage II analysis results can be found in the planning record at the Forest Service office in Monte Vista.

Benchmark Analysis

Benchmark analysis is specified in the NFMA regulation in 36 CFR 219 12(e). The NFMA regulations in 36 CFR 219.27 lists management requirements that must be considered in benchmark The following basic management requirements were included in the benchmark FORPLAN models.

* Timber harvest regulations
* Nondeclining flow and long-term sustained yield
* The ASQ is only generated from tentatively suitable timber lands
* Water quality and watershed protection
* Riparian area protection
* Base level of visual resource protection

The benchmark run used the entire Tentatively Suitable Timber Lands as the lands which could be scheduled and harvested The benchmark run, as is the case with all FEIS FORPLAN runs, calculated the volumes for conifer and aspen as noninterchangeable components(NIC). The use of the NIC was in response to comments about the possibility of cutting aspen in the future, and the desire by various interests to know what the ASQ for aspen could be Table L-3 summarizes the results of the benchmark runs and sensitivity analysis

The benchmark run scheduled 714,980 acres to cut a sawtimber volume of 48 8 MMBF/Year (3.4MMBF Aspen, 45 4MMBF Conifer)

Sensitivity runs were made to determine the affects of various constraints, use of different acreages and revenue fluctuations The findings of the sensitivity runs are

* The forest contains a considerable amount of lands which are uneconomic to harvest, as indicated by the differences in costs, revenues, volume, and benefit/cost ratios from the use of Max Volume vs Max PNV for the objective function
* Amount of aspen harvested is reduced when the Max PNV objective function is used which indicates much of the aspen is uneconomical
* In several runs, aspen cubic volumes are sustained but the board foot volume fluctuates considerably, indicating that there is a considerable amount of small diameter aspen being harvested by the model
* The affects of using the harvest expectation tables on the benchmark run reduced volumes by 17-23%
* Using ARC Net acreages instead of ARC Gross acreages reduced the cubic volumes(ASQ) by 5%

* A 20% increase in revenues did not really affect the ASQ in the benchmark run The increase was less than 1%(Run 2 vs Run 5) This supports the finding of considerable uneconomic forest lands on the forest

Table L-3. Benchmark & Sensitivity Runs
Based on entire Tentatively Suitable Timber Lands

	Units	Benchmark	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7
Objective Function		Max Volume	Max PNV	Max Volume	Max PNV	$180/MBF Max PNV	$110/MBF Max PNV	Max Volume
Constraints		Minimal*	Minimal	Standard	Standard	Minimal	Minimal	Minimal
Acreages		ARC Net**	ARC Net	ARC Net	ARC Net	ARC Net	ARC Net	ARC Gross
Planning Cycle Summary - 200 Year Period								
Acres Allocated to Timber Harvesting	Total Acres	714,983	564,252	566 400	501,033	564 878	571,900	753,320
Long-Term Sustained Yield								
Hardwood	mcf/year	4,794	1,179	5,085	2,889	1,165	1,388	5,153
Conifer	mcf/year	11,310	11,480	9,029	8,791	11 520	11,216	11,806
Sawtimber Harvest								
	mcf/decade	9,402	18	24,218	20,356	45	0	10,971
	MMBF/Decade	34 2	0 1	74 5	47 4	0 2	0 0	39 9
Hardwood	MMBF/Yr	3 4	0 0	7 4	4 7	0 0	0 0	4 0
	mcf/decade	110,165	113,335	90,142	87,415	113,709	110,691	114,917
	MMBF/Decade	454 0	456 2	370 0	348 5	458 3	444 1	474 7
Conifer	MMBF/Yr	45 4	45 6	37 0	34 9	45 8	44 4	47 5
Total mcf/Decade		119,567 0 0	113,353 0 0	114,360 0 0	107,771 0 0	113,754 0 0	110,691 0 0	125,888 0 0
Total MMBF/Decade		488 23	456 25	444 50	395 97	458 48	444 06	514 63
Total MMBF/Year		48 80	45 60	44 40	39 60	45 80	44 40	51 50
Roadless Areas Entered	Total #	31	31	31	25	31	30	19
Undeveloped Areas/Adj Wilderness Entered	Total #	24	23	23	16	23	21	36
PNV	M$	$194,633	$237,768	$169,942	$183,953	$301,263	$154,330	$203,479
First Decade Numbers								
1st Decade Harvest	Acres	91,828	84,878	97,499	70,264	87 327	72,954	96,370
Equivalent Clearcut Acres	ECA Acres	29,615	28,670	43,687	26,806	28,411	26,997	31,440
Total Revenue	M$/Decade	$83,439	$84,020	$70,747	$68,377	$101,212	$60,087	$87,185
Total Costs	M$/Decade	$59,948	$33,340	$53 789	$32,838	$34,306	$28 123	$60,727
Net Revenue	M$/Decade	$23,491	$50 680	$16,958	$35,539	$66,906	$31,964	$26,458
Revenue/Costs		1 4	2 5	1 3	2 1	3 0	2 1	1 4
Silvicultural Systems								
1st Decade - Clear/patch cut	Acres	9,201	12,257	26,117	13,122	11,177	13,667	10,059
1st Decade- Shelterwood	Acres	43,744	53,732	38,448	34,585	56,106	44,564	45,122
1st Decade - Group Sel	Acres	0	9,424	29,255	20,175	10,229	6,721	0
1st Decade - Ind Tree Sel	Acres	38,883	9,464	3,679	2 382	9,815	9,502	41,189
Transportation System								
1st decade - Local Road Construction	Miles	192	35	120	6	37	28	203
1st Decade - Reconst/Mntc	Miles	44	76	67	69	78	66	46
1st Decade - Collector Construction	Miles	104	23	118	54	23	16	86

*Minimal These are the minimum constraints possible Standard includes constraints for harvest expectations
**NET ARC The area representing roads and riparian was removed from each forested RMRIS site Road areas were calculated by buffering each type of road by a different width, which represents the average permanent road prism The buffered roads were combined with riparian areas in GIS The combined area was then removed from the RMRIS gross ARC acreage to determine Net ARC acreages

FORPLAN Constraints

Several constraints were developed for the FORPLAN model in response to the revision topics and the management requirements in the NFMA regulations (36 CFR 219 27) Most resource objectives and management requirements do not constrain the timber harvest levels Other requirements are satisfied by the management area allocation or in the development of silvicultural prescriptions in FVS The following are considered in the FORPLAN Model

Timber Regulation constraints: A Nondeclining yield constraint is considered in all alternatives The FORPLAN model projects harvests for 200 years and, at the end of the planning horizon, a perpetual timber harvest constraint is applied Timber flow constraints are based on cubic feet.

Watershed Considerations: Several watersheds have been determined to be at risk from additional disturbance. This is based on percent of watershed area that has been disturbed A concern or risk level has been established in the Revised Forest Plan based on percent area disturbed This Forest Plan level of assessment does not necessarily mean that streams have been damaged, only that a risk exists that they have been or will be damaged with additional disturbance No constraints will be placed on future disturbing activities unless more detailed field assessments show that streams have been impacted However, to avoid projecting a higher ASQ than can realistically be reached, constraints have been applied in FORPLAN to allow sufficient time to complete field assessments and, if necessary, restoration work Total effect of all constraints on the ASQ is roughly 1%

Watershed 13010004010307 (Unnamed Tributary to Saguache cr):

This small watershed is reported to have 62% of its area impacted by gullies and sheet erosion. It is a sensitive watershed, with nearly 70% of its soils having a high erosion hazard class. Since management actions would have marginal success in reclaiming such impacts, sufficient time for rest and natural recovery may be needed. The model will delay any harvest for 7 decades in this watershed

Watershed 13010004090106 (Cave Cr..).

Nearly 18% of this watershed appears to have been disturbed from past timber harvest and roading It is a sensitive watershed, with nearly 86% of its soils having a high erosion hazard class The model will delay any for 3 decades in this watershed. This should be sufficient time to complete field assessments and any needed rest or restoration work

Watershed 130100010603 (Workman Cr)

This small watershed appears to have had about 17% of its area disturbed by timber harvest and roading A high percentage (about 24%) of the timbered area has also been harvested The model will delay harvest for 3 decades in this watershed This should be sufficient time to complete field assessments and any needed rest or restoration work.

Watershed 130100011103 (Rio Grande Composite).

A large percentage of this watershed has been disturbed by roads and subdivisions There are no tentatively suitable timber lands in this area

Watershed 13010005060301 (Rito Hondo Cr .).

Nearly 17% of this watershed has been cumulatively disturbed from timber harvest, roading and grazing The model delay harvest for 3 decades in this watershed This should be sufficient time to complete field assessments and any needed rest or restoration work

Watershed 13010004020501 (Cantonment Cr..)

This small watershed appears to have had about 16% of its area disturbed by timber harvest and roading It is a sensitive watershed, with nearly 75% of its soils having a high erosion hazard class The model will delay harvest for 2 decades in this watershed This should be sufficient time to complete field assessments and any needed rest or restoration work

Watershed 13010001120101 (Difficult Cr .)

Nearly 16% of this watershed has been cumulatively disturbed from timber harvest and roading. The model will delay harvest for 2 decades in this watershed. This should be sufficient time to complete field assessments and any needed rest or restoration work.

Watershed 13010004090103 (Miners Cr .)

Nearly 16% of this watershed has been cumulatively disturbed from timber harvest and roading. The model will delay harvest for 2 decades in this watershed This should be sufficient time to complete field assessments and any needed rest or restoration work.

Watershed 13010004030102 (Upper Hat Springs Cr).

Nearly 15% of this watershed has been cumulatively disturbed from timber harvest, grazing and roading The model will delay harvest for 2 decades in this watershed This should be sufficient time to complete field assessments and any needed rest or restoration work

Watershed 130100030104 (Upper San Luis Cr.)

A large percentage of this watershed has been disturbed by roads There are no tentatively suitable timber lands in this area

Watershed 13010005050101 (Rio de Los Pinos Trib.).

This is a sensitive watershed with nearly 56% of its area within 100 feet of a stream channel About 14% of the watershed area has been disturbed in the past There are no tentatively suitable timber lands

Watershed 130100040202 (Saguache Cr).

This is a large watershed area that has had a lot of disturbing activities It is a sensitive watershed with over 70% of its soils having high erosion hazard class About 13% of its area appears to have been disturbed from timber harvest, roading and gullying The model will delay harvest for 2 decades in this watershed This should be sufficient time to complete field assessments and any needed rest or restoration work

Watershed 13010001130501 (Upper Park Cr..).

This is a sensitive watershed with nearly 61% of its area within 100 feet of a stream channel About 12% of the watershed area has been disturbed in the past. The model will delay harvest for 1 decade in this watershed. This should be sufficient time to complete field assessments and any needed rest or restoration work

Watershed 13010001130701 (Beaver Cr /Race Cr)

This is a sensitive watershed with nearly 54% of its area within 100 feet of a stream channel About 10% of the watershed area has been disturbed in the past The model will delay harvest for 1 decade in this watershed This should be sufficient time to complete field assessments and any needed rest or restoration work.

Watershed 13010003020104 (Copper Cr)

This watershed has a high percentage of disturbance located close to stream channels. There are no tentatively suitable timber lands in this watershed.

Opening/Wildlife Constraints: Openings in forested cover types are created by certain types of timber harvesting These types include. Patch cuts, clear cuts, the second and third step of a three-step shelterwood, and both cuts of a two-step shelterwood.

If too many openings occur in an area at any one time, then there is a concern that there will be insufficient hiding cover for big game animals such as elk and deer

To prevent too many openings to occur at any one time, it was determined from grid analysis that 36% of an area could be harvested and still leave hiding cover between openings. Analysis from the biodiversity assessment revealed that the RGNF has no known species dependent on interior-forest characteristics, thus a disturbance/undisturbed area ratio of 2:1 was determined to be adequate From the FVS runs, it was found to take three decades for a stand to recover sufficiently after harvesting for it to be used as hiding cover.

The application of the opening constraint was on harvested lands within a Th level watershed

Harvest Expectation Constraints: Several constraints were developed for each alternative to have the model mimic the historic and intended mix of silvicultural prescriptions The mix of prescriptions was varied, based on the theme of the alternative A more commodity type alternative used more even-aged prescriptions versus uneven-aged prescriptions

These harvest expectation constraints were formulated for each cover type and silvicultural prescription. These constraints limited either the minimum, the maximum or a range of acreage percentages which the model should allocate to a particular prescription

Financial and Economic Efficiency

Economic efficiency is defined as how well the dollars invested in each alternative produce benefits to society Present Net Values (PNV), and indices for Benefit/Cost and Revenue/Cost were used as indicators of economic efficiency

To calculate these efficiency indicators, a spreadsheet was developed which tracks revenues, costs and benefits for a fifty year period Built into the spreadsheet were increases and decreases in values over time based on predicted changes in usage, outputs, or costs

In calculating PNV and the other indices shown in Chapter 3, a four percent discount rate was used. The per unit values do not change by alternative, but the quantities and timing do change The financial values used were based an actual revenues and costs

Economic values were based on either actual revenues or based on a willingness to pay evaluation. These economic values (from the Rocky Mountain Region of the US Forest Service) were used for recreation, grazing, hunting, wildlife use, and water outputs

Procedures for Estimating Economic Impacts

Overview

Economic impacts were estimated using the best available data and tools There is no one tool or data set were used for all purposes As noted in each section below, data that was best suited for estimating the impacts of one resource were not necessarily the best for estimating impacts of other resources Some data are confidential in nature, other data are available to the public IMPLAN (described below) was the primary tool for determining impacts, but the method of using IMPLAN varied by resource and data availability

Measures of Impacts

Impacts to local economies can be measured in several ways. Typically, employment and income are the most common and best understood measures Employment is expressed in "jobs" -- a job can be seasonal or year-round, full-time or part-time Income is expressed "dollars" -- this dollar can come from wages, salaries, rent, or profit

Base Year Data

The most comprehensive and consistent data available for employment and income are provided by Bureau of Economic Analysis' Regional Economic Information System (REIS) The most recent release of county-level data was June 1996 This release included data from 1969 to 1994 IMPLAN uses this data as the fundamental basis in its economic data base, but must make small modifications to consistently and fully integrate it into the input-output framework

IMPLAN

IMPLAN is a system composed of both software and data IMPLAN was originally developed by the USDA-Forest Service in the late '70s and early '80s to model the many rural economies affected by agency programs and policies It is a secondary-data-based input-output modeling system. While the software used for this analysis remains in the public domain, the database is now owned and maintained by the Minnesota IMPLAN Group, Inc. (MIG) IMPLAN is used by universities, extension professionals, private consultants, and public agencies throughout the country as a reliable, cost-effective way to estimate the employment, income, and other economic effects of both private and public sector endeavors Numerous academic papers and publications each year use and cite the IMPLAN modeling system

For the purpose of analyzing the impacts of Forest Plan revision alternatives, the 1992 database was used Although the 1993 database was available, the 1992 data was consistent with the latest Census of Agriculture -- an important element in determining the impact of Forest Service programs Although IMPLAN models reflected 1992 conditions, the impact results may be expressed in whatever year is appropriate by using inflation factors

IMPLAN was used to provide multipliers for direct dollar changes or response coefficients for changes in output production. Because input-output models are linear, multipliers or response coefficients need only be calculated once per model and then applied to the direct change in output Spreadsheets were then employed to calculate total effects Specifications for developing response coefficients are stated in each section below, multipliers were taken from optional reports generated when each model is constructed

The IMPLAN model developed for the Forest included the Colorado counties of Alamosa, Conejos, Costilla, Mineral, Rio Grande, and Saguache No adjustments were made to the basic IMPLAN data.

Timber

Data

Primary data for the sawmill and logging sectors in the Rocky Mountain Region are not readily available in published data bases Because there are often only 1 or 2 mills in a county, privacy laws restrict access to this data. Occasionally, informal surveys done by industry agreement or state-wide surveys by public agencies provide the best available data The best and most recent employment data that allows correlations with production were collected by the timber industry in New Mexico and Arizona This information was provided to the Forest Service in 1990 in conjunction with studies done regarding the Mexican Spotted Owl While data for individual firms is confidential, industry-wide data is available This data was compared with studies in progress in Wyoming for validation

The best source of wages and salaries came from "1995 Statewide Wage Survey Results. Agriculture Forestry, Construction and Operator Occupations" in the September 1995 issue of Wyoming Labor Force Trends (Wyoming Employment Resources Division) Another study by the same state agency in June 1992 entitled "Wyoming Timber Industry Structure, Conduct, and Expectations" provided similar information In both studies, payroll expenses per employee were shown by three-digit SIC industry (241 & 242) Because total income includes proprietor sources as well as employee compensation, the relationship between the two in IMPLAN was used estimate total income from payroll data. Because mills in Wyoming conduct business in both Colorado and South Dakota, it was felt these estimates were reasonable for the area involved

Use of the Model

Type III multipliers for employment and total income were taken from model reports (#606 and #604) Multipliers for the Logging sector (#133) and Sawmill sector (#134) were then applied to the direct employment and total income per MMBF from above to determine total effects per MMBF Results were then multiplied by total MMBF production to estimate total effects in the local economy

Grazing

Data
The best available data for agriculture is found in the 1992 Census of Agriculture Total farm livestock inventory times 12 months provided an estimate of total animal-months in the model area Where disclosures existed in the Census data, numbers were estimated based on average farm numbers in nearby counties. Animal-months of grazing on Forest Service land were provided from FS permit records. A proportion of FS animal-months to total animal-months was calculated.

Use of the Model
To use the data above, it was necessary to know the impacts of a one percent change in total production Cattle production is split in IMPLAN between Ranch-fed (#3) and Range-fed (#4) sectors Sheep production is captured completely with one sector (#6) One percent of each sector's total industry output was run through the model, without using local purchase coefficients. Results were then multiplied by the changing proportion of FS animal-months to total animal months for each alternative

Recreation

Data
Surveys of expenditures by recreationists for different kinds of recreation activities have been collected over several years The expenditures were distributed among different industries according to their spending patterns The results were then converted to a common unit of measure -- Recreation Visitor Day (RVD) The numbers of RVDs by activity for each Forest Plan alternative were estimated

Use of the Model
Expenditures for every 1,000 RVDs (MRVD) were run through the model with local purchase coefficients applied. The results (response coefficients for employment and total income)were then incorporated into a spreadsheet where they were multiplied by non-local MRVDs only.

Federal Expenditures

Data
Total Forest Service expenditures were estimated for each alternative based on full and experienced program levels. The proportion that goes toward salaries (cost to government) was estimated from current salary/non-salary ratios. Total FS employment was also made available from agency records

Use of the Model
To obtain an estimate of total impacts from Forest Service spending, each portion (direct, indirect, and induced) of the impact must be handled separately Direct impacts are simply Forest Service employment and salaries (cost to government) No further calculations are necessary to determine direct impacts Indirect impacts are the consequence of local non-salary expenditures The Washington Office of the FS has built an expenditure profile that represents the typical way in which a national forest spends its budget This profile was run through the model for non-salary expenditures per $1 million Induced impacts result from FS employees spending a portion of their salaries locally IMPLAN includes a profile of

personal consumption expenditures for three income categories; the middle income category was used to represent average Forest Service employees. This profile was also run through the model per $1 million. Across the U S., Americans typically spend about 67% of their total salary plus benefits. Therefore, FS salaries are multiplied by 0.67 before the induced coefficient on a "per $1 million" basis is applied Multiplication are made in a spreadsheet

Rationale for using only non-local recreation use for changes in Final Demand in IMPLAN.

Local impacts of tourism or other forms of recreation are attributable to expenditures by those not already residing in the local area Tourism is in effect an export of goods and services. The export of goods and services result in the import of new (or maintenance of existing) money that supports new (or maintenance of existing) wages, salaries, profits, and jobs. These impacts are generated in IMPLAN by introducing additions to Final Demand.

If the export of recreation increases, jobs are created and population increases follow (Population increases result when a constant rate of unemployment is assumed; if local labor force participants fill the new jobs, the unemployment rate decreases.) With new jobs & income, there is an increase in local economic activity -- including the recreation component of household expenditures This is reflected in IMPLAN through the household sector as induced effects.

New expenditures by local residents for recreation activities not associated with new exports generally do not result in new economic activity, unless income per capita or population increases If income or population is constant, additional expenditures for recreation are offset by reductions in expenditures elsewhere in the local economy (savings being held constant) Local recreation expenditures are accounted for in IMPLAN through the existing household sector.

Table M-4 Economic Impact Worksheet - Values used in IMPLAN
Values are Per Year - Average for the First Decade
(Differences in Full / Experienced Budget Levels are displayed)

Activity	Units	ALT A Level	ALT B Level	ALT D Level	ALT E Level	ALT F Level	ALT G Level	ALT NA Level
Softwood - sawtimber	MMBF	19/ 19	25 8/ 15 22	21 74/ 9 59	12 66/ 6 72	7 79/ 31 8	21 43/ 11 69	18 95/ 9 59
Aspen	MMBF	0/0	3 20/0	1/0	1/0	1/0	1 86/0	2 39/0
Roundwood	MMBF	13/ 13	35/ 21	28/ 18	2/ 16	17/ 16	29/ 19	27/ 18
Fuelwood	MMBF	2 43/ 2 43	6 63/ 4 03	5 4/ 3 33	3 8/ 3 14	3 25/ 3 12	5 49/ 3 54	5 11/ 3 33
Camping								
Local	MRVD	55 2	57 5	56 4	57 5	54 8	58 5	53 7
Nonlocal	MRVD	312 9	325 6	319 4	325 6	310 3	331 6	304 2
Disp Nonmotorized Rec								
Local	MRVD	57 0	58 1	58 1	58 0	55 9	59 2	54 3
Nonlocal	MRVD	323 1	329 2	329 2	329 3	316 9	335 4	307 7
Disp Motorized Rec								
Local	MRVD	20 1	24 1	25 4	22 5	16 9	25 9	26 8
Nonlocal	MRVD	113 7	136 5	144 1	127 4	95 5	146 8	151 6
Water based Rec								
Local	MRVD	3 3	3 7	3 6	3 7	3 3	4 0	3 1
Nonlocal	MRVD	18 9	21 2	20 2	21 2	18 9	22 0	17 7
Downhill Skiing								
Local	SDays	23 3	24 1	23 6	24 1	23 3	27 5	22 5
Nonlocal	SDays	122 1	126 2	123 9	126 2	122 1	125 6	118 0
Big game hunting								
Local	MRVD	47 7	47 7	47 7	47 7	47 7	47 7	47 7
Nonlocal	MRVD	39 0	39 0	39 0	39 0	39 0	39 0	39.0
Small Game Hunting								
Local	MRVD	6 7	6.7	6 7	6 7	6 7	6 7	6 7
Nonlocal	MRVD	2 8	2 8	2 8	2 8	2 8	2 8	2 8
Non consumptive Wildlife								
Local	MRVD	1 7	2 0	2 0	2 0	1 7	2 0	1 6
Nonlocal	MRVD	10 0	11 3	11 3	11 3	10 0	13 3	9 0
Fishing								
Local	MRVD	16 7	16 7	16 7	16 7	16 7	16 7	16 7
Nonlocal	MRVD	94 4	94 4	94 4	94 4	94 4	94 4	94 4
Grazing								
Cattle	AM	50974	72890	72890	60860	33036	72890	72890
Sheep	AM	5103	7297	7297	6093	3307	7297	7297
USFS Expenditures								
Salaries	MM$	4 997/ 3 194	6 726/ 3 262	6 133/ 3 242	5 644/ 3 132	5 211/ 3 104	5 804/ 3 229	6 111/ 3 219
Other Exp	MM$	4 088/ 2 613	5 503/ 2 669	5 018/ 2 653	4 617/ 2 562	4 264/ 2 539	4 749/ 2 642	5 000/ 2 634
Expenditure numbers based on FY94 Total Budget by Object Class Report 55% budget on Salary, 45% nonsalary Expenditures								

Water Yield Calculations

The water-yield model used is a WRENS (Water Resources Evaluation of Non-point Silvicultural Sources) model. It provided a coarse analysis of expected increased water yield. Detailed studies show that stream flow is increased when trees are cut. To get a rough estimate of increased flow resulting from timber harvest, Forest averages of aspect elevation, and precipitation conditions were used. The results are not intended to express an actual amount of water that would be produced by each alternative. Too much variability exists to accurately figure out exact amounts of increased water yield, especially for such a broad-scaled analysis as is required by a Forest Plan. Model results do provide a convenient way of expressing the relative effects of timber harvest between alternatives

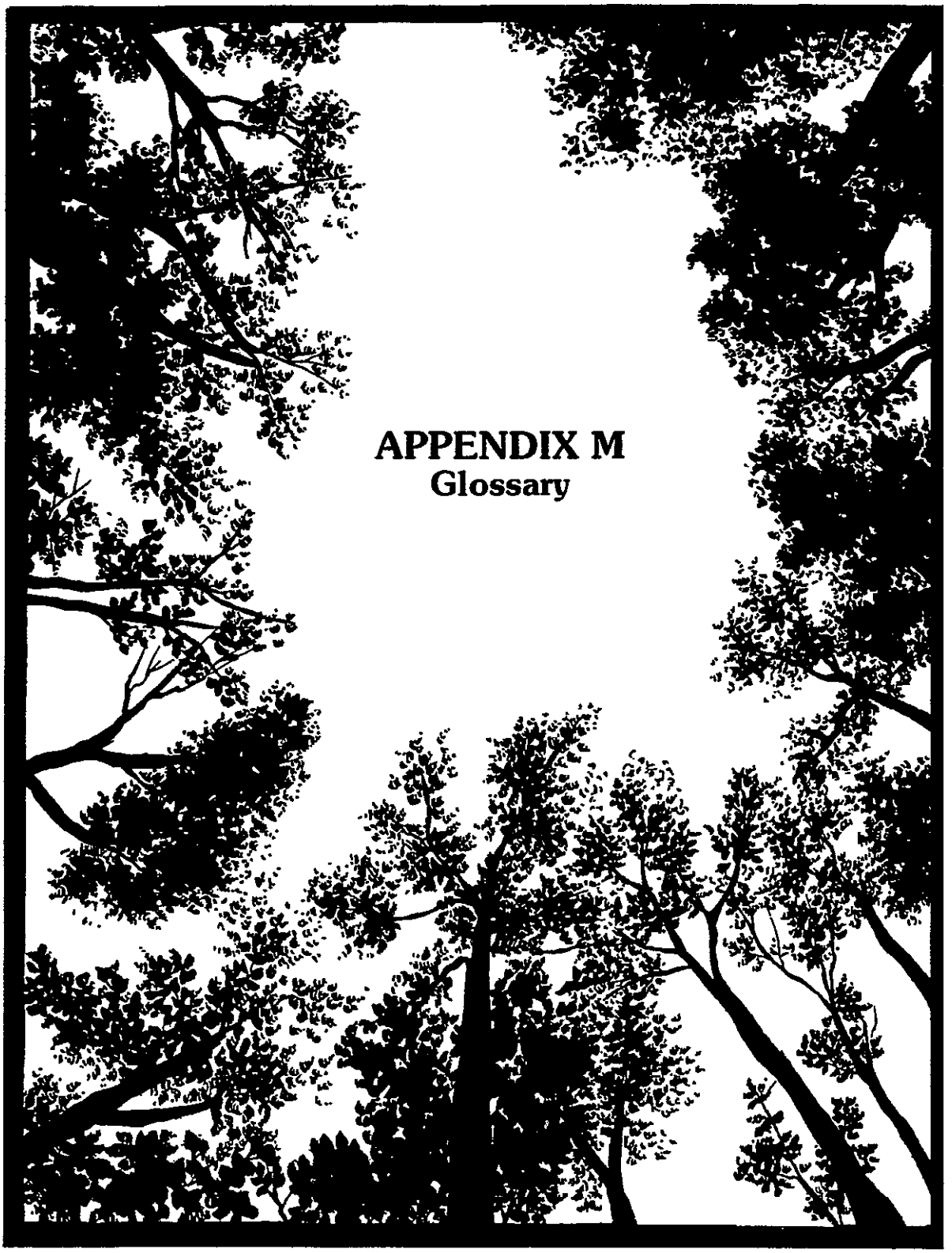
Water yield increases were assumed to be directly proportional to the reduction in basal area This reduction was converted to equivalent clearcut acres, which were multiplied by coefficients derived from Forestwide average conditions. Estimated increases from past activities included a gradual decline over time from when the timber harvest occurred, recognizing the result of reforestation Estimated increases from proposed alternatives only considered the initial increase in water yield and did not project that increase further into the future

Watershed Disturbance Analysis (Cumulative Watershed Impact Analysis)

Watershed condition was analyzed watershed by watershed All known surface disturbances were identified for each watershed. A method described in a white paper called Watershed Analysis (Dobson, 1995) was used to equate different types of disturbance so that all disturbed acreage could be added together

The basic idea behind the method is that surface disturbances reduce infiltration potential and increase overland flow. The most drastic effect is caused by a road, which completely compacts the surface and removes all vegetation. A disturbed area factor of 1 0 was assigned to road disturbances Other activities remove vegetation or compact surfaces to a lessor degree than roading does. Such disturbances were assigned a disturbed area factor less than I O. Disturbed area factors were arrived at by comparing Soil Conservation Service curve numbers between one type of disturbance and that of a road. The disturbed area factor multiplied by the acreage for that type of disturbance produced an equivalent roaded disturbance. All equivalent roaded disturbances could then be added together

Total disturbance was divided by watershed area to get percent disturbance for each watershed Research suggests that when total compaction in a watershed reaches a certain level, there will be a significant increase in overland flow and resulting stream flow. In some watersheds this has occurred when 6% of the watershed has been compacted. The Forest Plan Interdisciplinary Team felt that when total disturbance exceeded 15% of a watershed area (10% for sensitive watersheds) there was a high degree of concern for watershed health These watersheds were identified as watersheds of highest concern. Any watershed with total disturbance over 12% (7% for sensitive watersheds) was identified as a watershed of concern.



APPENDIX M
Glossary

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Glossary

A

Access -- Road or trail route over which a public agency claims a right-of-way for public use, a way of approach

Acre-foot -- A water volume measurement equal to the amount of water that would cover one acre to a depth of one foot (43,560 cubic feet or 325,851 gallons)

Activity fuels -- Fuels resulting from or altered by forestry practices such as timber harvest or thinning, as opposed to naturally created fuels.

Adaptive management -- Implementing policy decisions as an ongoing process that requires monitoring of results It applies scientific principles and methods to improve resource management activities incrementally as managers and scientists learn from experience and new scientific findings and adapt to social changes and demands

Age class -- Groups of trees or shrubs approximately the same age

Air Quality Classes -- Classifications established under the Prevention of Significant Deterioration portion of the Clean Air Act, which limit the amount of air pollution considered significant within an area Class I applies to areas where almost any change in air quality would be significant. Class II applies to areas where the deterioration normally accompanying moderate, well-controlled growth would be permitted Class III applies to areas where industrial deterioration would generally be allowed

Allotment Management Plan (AMP) or Range Project Decision (RPD) -- The document containing the action program needed to manage the range resource for livestock grazing, and possibly wildlife grazing It considers soil, watershed, wildlife, recreation, timber, and other resources on lands within a range allotment

Allowable Sale Quantity (ASQ) -- The quantity of timber that may be sold from the area of suitable land covered by the Forest Plan Both the time period and utilization standards are specified by the Forest Plan This is usually expressed on an annual basis as the "average annual allowable sale quantity "

Alluvium -- Clay, silt, sand, gravel, or other rock materials transported by flowing water Deposited in comparatively recent geologic time as sorted or semi-sorted sediment in riverbeds, estuaries, flood plains, lakes, shores, and in fans at the base of mountain slopes.

Alternative -- A mix of management prescriptions and land allocation applied to specific land areas to achieve a set of goals and objectives The resulting alternative provides the management direction of the Forest or project area

Animal Unit Month (AUM) -- The quantity of forage required by one mature cow (1,000 lbs and one calf) or the equivalent, for one month

Application for Permit to Drill (APD) -- An application to drill a well submitted by a lessee or operator to the BLM The APD consists of a Drilling Plan that discusses downhole specifications and procedures (reviewed by the BLM) and a Surface Use Plan of Operations (SUPO) that examines surface uses, including access roads, well site layout, cut/fill diagrams, reclamation procedures, production facility locations, etc. (reviewed by the Forest Service) The approved APD is a contract between the operator and the federal government and cannot be changed or modified unless authorized by the BLM and FS

Aquatic ecosystem -- The stream channel or lakebed, water, biotic communities, and the habitat features that occur there

Arterial roads -- Primary travel routes that provide service to a large land area and which usually connect with public highways or other Forest Service arterial roads

Availability for Oil and Gas Leasing -- Availability of NFS lands for oil and gas leasing refers to lands which have not been formally withdrawn from oil and gas leasing activities All NFS lands will be subject to determination of compatibility of oil and gas leasing activities with the affected resources as well as the human environment before the Forest Service consents to leasing

B

Background -- A term used in scenery management to describe that part of a scene or landscape that is farthest from the viewer, usually three miles to infinity from the observer

Basal area -- The cross-sectional area, in square feet, of a tree measured at breast height (4 5 feet)

Basin -- A depressed area with no surface outlet A low in the earth's crust of tectonic origin in which sediments have accumulated

Benefit Cost Ratio (B/C Ratio) -- The total value of all monetary and nonmonetary benefits divided by the total discounted costs required to produce those benefits

Bentonite -- A clay formed by the decomposition of volcanic ash, which has the ability to absorb large quantities of water and expand to several times its normal volume

Best Management Practices (BMPs) -- The method, measure or practice selected by an agency to meet its nonpoint-source pollution control needs BMPs include, but are not limited to, structural controls, operations, and maintenance procedures BMPs can be applied before, during, or after pollution-producing activities to reduce or eliminate the introduction of pollutants into the water

Big game -- Those species of large mammals normally managed for sport hunting (elk, deer, bear, antelope)

Biological diversity -- *Also biodiversity Refers to "the full variety of life in an area, including the* ecosystem, plant, and animal communities, species and genes, and the processes through which individual organisms interact with one another and with their environment (USDA Forest Service, 1991) " Biodiversity occurs at many different levels, which can range from the molecular scale to complete ecosystems Therefore, the term comprises the relative abundance of genes, species, and ecosystems (Office of Technology Assessment {OTA})

Biodiversity is composed of three primary attributes: composition, structure, and function R F Noss (1990) states "Composition has to do with the identity and variety of elements in a collection, and includes species lists and measures of species diversity and genetic diversity (name the elements) Structure is the physical organization or pattern of a system, from habitat complexity as measured within communities to the pattern of patches and other elements at a landscape scale (ecological patterns) Function involves ecological and evolutionary processes, including gene flow, disturbances, and nutrient cycling (natural processes) "

Biological Evaluations (BE)-- As defined by FSM 2670 5, a biological evaluation is a documented Forest Service review of Forest Service programs or activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed, or sensitive species FSM 2672 4 identifies biological evaluation objectives and standards

Biotic - Usually refers to living organisms in their ecological rather than their physiological relations

Board Foot (BF) -- Measure of an amount of timber equivalent to a piece of 12 inch x 12 inch x 1 inch lumber

Broadcast burning -- Allowing a prescribed fire to burn over a designated area within well-defined boundaries to achieve some land management objective

Browse -- The buds, shoots, and leaves of woody plants eaten by livestock or wild animals

C

Caldera -- A large basin-like depression resulting from the explosion or collapse of the center of a volcano

Candidate species -- Those plant or animal species which in the opinion of the U S Fish and Wildlife Service (USFWS), may become endangered or threatened

Canopy -- The uppermost spreading, branchy layer of a forest

Canopy closure (or canopy cover) -- The progressive reduction in space among tree crowns as they spread laterally (Ford Robertson, 1971), a measure of the percentage of potential open space occupied by the collective tree crowns in a stand

Cavity nester -- Wildlife species that excavate and/or occupy cavities in trees and snags

Channel -- A passage, either naturally or artificially created, that periodically or continuously contains moving water, or that forms a connecting link between two bodies of water River, creek, run, branch, and tributary are some of the terms used to describe natural channels Natural channels may be single or braided Canal and floodway are some of the terms used to describe artificial channels

Clearcutting -- The harvest of all trees in a localized area, generally to encourage regeneration of a new, even-aged stand or to meet other specified nontimber resource objectives

Clone -- A group of plants (for example, aspen) growing in close association, derived by asexual reproduction from a single parent plant

Cobbles -- Rounded rocks between 3 and 10 inches in size

Commercial thinning -- Cutting in immature stands to improve the quality and growth of the remaining stand Trees removed in the thinning are used for sawtimber or products (poles, posts, fuelwood, etc)

Commercial timber sales -- The selling of timber from national forest lands for the economic gain of the party removing and marketing the trees

Climax -- The culminating stage in plant succession for a given site where the vegetation has reached a highly stable condition

Code of Federal Regulations (CFR) -- The listing of various regulations pertaining to management and administration of the National Forests.

Common variety minerals -- Deposits that do not possess a distinctly special economic value, although they may have value for use in trade or manufacture These minerals include, sand, stone, gravel, pumicite, cinders, and pumice

Condition of Approval (COA) -- Conditions or provisions (requirements) under which an Application for Permit to Drill or a Sundry Notice is approved

Confluence -- The point where two streams meet

Conifer sawtimber -- Engelmann spruce, subalpine fir, lodgepole pine, ponderosa pine, Douglas-fir, and other conifer species

Constraint -- A qualification of the minimum or maximum amount of an output or cost that could be produced or incurred in a given time period

Construction -- The displacement of vegetation, soil, rock, and the installation of human-made structures involved in the process of building a complete, permanent road facility The activities occur at a location or corridor that is not currently occupied by a road

Consumptive use -- A use of resources that reduces the supply, such as mining, hunting, and fishing

Contain -- To surround a fire and any spot fires with a control line as needed, which can reasonably be expected to check the fire's spread under prevailing conditions

Controlled Surface Use (CSU) -- Allowed use and occupancy, unless restricted by another stipulation, with identified resource values requiring special operational constraints that may modify the lease rights CSU is used as an operating guideline, not as a substitute for No Surface Occupancy (NSO) or timing stipulations

Cord -- A unit of gross volume measurement for stacked roundwood based on external dimensions Generally implies a stack of 4 feet by 4 feet vertical cross sections 8 feet long or 128 stacked cubic feet

Corridor (Ecosystem) -- Connective links of certain types of vegetation between patches of suitable habitat, which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat

Corridor (Utility or Right-of-Way) -- A linear strip of land defined for the present or future location of transportation or utility right-of-way within its boundaries

Cost efficient -- See definition of economically efficient

Cost efficiency -- The usefulness of specified inputs (costs) to produce specified outputs (benefits) In measuring cost efficiency, some outputs including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specific levels in the least cost manner Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate

Council on Environmental Quality (CEQ) -- An advisory council to the President established by the National Environmental Policy Act of 1969 It reviews federal programs for their effects on the environment, conducts environmental studies, and advises the President on environmental matters

Cover type -- The dominant vegetation in an area, for example, aspen, ponderosa pine, or sedges

Created opening -- A treated forest area 10 basal area or less, which is designed to produce forage

Critical habitat -- Habitat of federally listed threatened or endangered species, on which are found those physical and biological features that are essential to conservation of the species and which may require special management considerations or protection This habitat may currently be occupied, or determined by the Secretary of the Interior to be essential, for areas outside the species' current range

Crown -- The upper part of a tree or other wood plant carrying the main branch system and foliage, and surmounting at the crown base a more or less clean stem

Crown height -- For a standing tree, crown height is the vertical distance from ground level to the base of the crown, measured either to the lowest live branch-whorl or to the lowest live branch, excluding shoots arising spontaneously from buds on the stem of a woody plant or to a point halfway between

Cull logs -- Logs that are cut during a timber harvest but are commercially unusable because they do not meet certain specifications

Culmination of Mean Annual Increment (CMAI) -- The point at which a tree or stand achieves its highest average growth, based on expected growth, according to the management intensities and utilization standards assumed in the Forest Plan

Cumulative effects -- Results of collective past, present, and reasonably foreseeable future actions

Cumulative impacts -- The impacts on the environment that results from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time

Cunits -- Hundred cubic feet (of timber)

Cutover area -- Timber stands that have been cut

Cutting cycle -- The planned, recurring lapse in time between successive cutting in a timber stand

D

Deadfall -- A fallen dead tree

Decadence -- A process, condition, or period of deterioration or decline

Demand -- The amount of an output that users are willing to take at a specified price, time period, and condition of sale

Desired Condition (DC) -- The physical changes which are anticipated to result from carrying out planned management practices at two points in time, at the end of 10 years and at the end of 50 years (The Forest and Rangeland Renewable Resources Planning Act of 1974 {RPA] planning horizon)

Developed recreation -- Recreation which occurs at man-made developments, such as campgrounds, picnic grounds, resorts, ski areas, trailheads, etc Facilities might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings Campgrounds and picnic areas are examples of developed recreation sites

Development Well and Full-Field Development --

> **Development well:** Well drilled in proven territory in a field to complete a pattern of production
>
> **Full-Field Development:** The drilling of the necessary development wells and associated field facilities, including roads, production facilities, pipelines, injection wells, power lines, etc

Diameter at Breast Height (DBH) -- The diameter of a standing tree measured at a point 4 feet, 6 inches from ground level on the uphill side

Direct effects -- Results of an action occurring when and where that action takes place

Directional drilling -- Drilling boreholes with the course of hole planned before drilling. Such holes are usually drilled with rotary equipment at an angle to vertical and are useful in avoiding obstacles or in reaching side areas or the mineral estate beneath restricted surface

Discovery well -- A well that yields commercial quantities of oil and gas

Discount rate -- An interest rate that represents the cost or time value of money in determining present value of future costs and benefits

Discretionary "No Lease" -- Forest Service discretionary authority to remove sensitive resource lands from oil and gas leasing Authority must be based on sound management justification The Federal Onshore Oil and Gas Leasing Reform Act of 1987 expanded the Forest Service authority to include a "discretion" to consent or deny consent on all National Forest System lands with leasable minerals Formerly, the BLM had authority to issue oil and gas leases on public domain lands without Forest Service consent According to the Reform Act, the BLM may not issue an oil and gas lease on NFS lands without consent from the Forest Service

Dispersed recreation -- That type of outdoor recreation which tends to be spread out over the land and in conjunction with roads, trails, and undeveloped waterways Activities are often day-use oriented and include hunting, fishing, boating, hiking, off-road vehicle use, cross-country skiing, motorbiking, and mountain climbing

Distance zone -- One of three categories used in the Visual Management System to divide a view into near and far components The three categories are (1) foreground, (2) middleground, and (3) background

Disturbance -- A discrete event, either natural or human induced, that causes a change in the existing condition of an ecological system

Diversity -- Refers to the distribution and abundance of different plant and animal communities and species within an area This term is not synonymous with "biological diversity."

Down -- A tree or portion of a tree that is dead and lying on the ground

Down-woody material -- Woody material, from any source, that is dead and lying on the forest floor

Duff -- Organic matter in various stages of decomposition on the floor of the forest

E

Easement -- A right afforded a person or agency to make limited use of another's real property for access or other purposes

Ecological approach -- Natural resource planning and management activities that assure consideration of the relationship between all organisms (including humans) and their environment

Ecological classification -- A multifactor approach to categorizing and delineating, at different levels of resolution, areas of land and water having similar characteristic combinations of the physical environment (such as climate, geomorphic processes, geology, soil, and hydrologic function), biological communities (such as plants, animals, microorganisms, and potential natural communities), and the human dimension (such as social, economic, cultural, and infrastructure).

Ecological process -- The actions or events that link organisms (including humans) and their environment, such as disturbance, successional development, nutrient cycling, carbon sequestration, productivity, and decay

Economic efficiency -- The effectiveness of inputs (costs) in producing outputs (benefits) and effects when the computations include all identified and valued costs and benefits Usually, measurement of economic efficiency uses present net value, though the use of benefit-cost ratios and rates-of-return sometimes may be appropriate

Economically efficient -- Any time the value of the benefits exceeds the costs A measure of direct and indirect market and nonmarket costs and benefits considering monetary (dollar) values assigned to various outputs including the nontimber multiple-use benefits

Ecoregion -- A continuous geographic area over which the macroclimate is sufficiently uniform to permit development of similar ecosystems on sites with similar properties Ecoregions contain multiple landscapes with different spatial patterns of ecosystems

Ecosystem -- All organisms in a community plus the associated environmental factors

Ecosystem Management -- The use of an ecological approach that blends social, physical, economic and biological needs and values to assure productive, healthy ecosystems

Edge -- The place where plant communities meet or where successional stages or vegetative conditions within plant communities come together

Endangered species -- Any species which is in danger of extinction throughout all or a significant portion of its range

Endemic species - A species whose natural occurrence is confined to a certain region and whose distribution is relatively limited

Environmental Impact Statement (EIS) -- A formal public document prepared to analyze the impacts on the environment of a proposed project or action and released for comment and review It is prepared first in a draft or review form and then in a final form An EIS must meet the requirements of NEPA, The Council on Environmental Quality (CEQ) guidelines, and directives of the agency responsible for the proposed project An impact statement includes the following points (1) the environmental impact of the proposed action, (2) any adverse impacts that cannot be avoided by the action, (3) the alternative courses of actions, (4) the relationships between local short-term use of the human environment and the maintenance and enhancement of long-term productivity, and (5) a description of the irreversible and irretrievable commitment of resources, which would occur if the action were accomplished

Ephemeral Stream -- A stream or portion of a stream which flows briefly in direct response to precipitation in the immediate vicinity, and whose channel is at all times above the water table

Erosion -- Detachment or movement of the land surface by water, wind, ice, gravity or other geological activity Accelerated erosion is much more rapid than normal, natural, geologic erosion, primarily as a result of the influence of activities of man, animals, or natural catastrophes

Evapotranspiration -- The sum total of water lost from the land by evaporation (water loss from soil or plant surfaces) and plant transpiration (water absorbed by plants from soil and translocated to the leaves)

Excavators -- Bird species that excavate nest cavities in trees

Even-aged management -- The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together Managed even-aged forests are characterized by a distribution of stands of varying ages (and therefore, tree sizes throughout the forested area) The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harvested Clearcut, shelterwood, or seed-tree cutting methods produce even-aged stands (36 CFR 219 3)

Executive Order (EO) -- An order of regulation issued by the President or some administrative authority under his or her direction

Existing Visual Condition (EVC) -- An inventory of the present state of scenic alteration The existence, size, and location of alterations are identified through the use of six categories, category one having the least alternations and category six the most

F

Facility -- Structures needed to support the management, protection, and use of the National Forests, including buildings, utility systems, dams, and other construction features There are three types of facilities recreation, administrative, and permittee

Fee site -- A Forest Service recreational area in which users must pay a fee Fee sites must meet certain standards and provide certain facilities

Financially efficient -- Any time an activity produces net returns to the U S Treasury A measure of direct market costs and benefits considering only monetary (dollar) values

Fire suppression -- All the work and activities connected with fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished

Fiscal Year (FY) -- October 1 to September 30 The Fiscal Year is referred to by the calendar year beginning January 1 For example, October 1, 1994 to September 30, 1995 is referred to as Fiscal Year 1995

Floodplain -- That portion of a river valley, adjacent to the channel, which is built of sediments deposited during the present regimen of the stream and is covered with water when the river overflows its banks at flood stages

Fold -- A curve or bend of a structure such as rock strata, bedding planes, foliation, or cleavage A fold is usually a product of deformation, although its definition is descriptive and not genetic and may include primary structures

Forage -- All browse and herbaceous foods that are available to grazing animals

Forb -- Any herbaceous broad-leaved plant species

Foreground -- A term used in scenery management to describe the portions of a view between the observer and up to one-quarter to one-half mile distant

Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) -- An Act of Congress requiring the preparation of a program for the management of the National Forest's renewable resources, and of land and resource management plans for units of the National Forest System It also requires a continuing inventory of all National Forest System lands and renewable resources

Forest Development Road (FDR) -- Roads that are part of the Forest development transportation system, which includes all existing and planned roads as well as other special and terminal facilities designated as Forest development transportation facilities

Forest Development Trail (FDT) -- As defined in 36 CFR 212 1 and 261 2, those trails wholly or partly within or adjacent to and serving, the National Forests and other areas administered by the Forest Service that have been included in the Forest Development Transportation Plan Trail is a term denoting a pathway for purposes of travel by foot, stock, or trail vehicle

Forest Facility Master Plan -- The plan that depicts the development and management of the Forest's facilities This includes current volume of business and projections for the future, locations for needed skills to perform program work, existing administrative sites and proposed locations of new sites, and management strategies concerning consolidation or sharing services between units

Forest health -- A condition where biotic and abiotic influences on the forest (i e , insects, diseases, atmospheric deposition, silvicultural treatments, harvesting practices) do not threaten management objectives for a given Forest unit now or in the future

Forest interior bird species -- Birds that have the following characteristics 1) long-distance migrants that winter primarily in the New World Tropics, 2) they are obligate inhabitants of forest interior, 3) they nest on or near the ground, 4) they build nests in the open rather than in the protection of cavities, 5) they raise only a single brood of young per year, and 6) they have a comparatively small clutch size

Forest interior habitat -- That portion of the stand not affected by edge is termed interior habitat The value of forest stands in providing interior habitat depends on the effects of edge on the microclimate of the stand (Lehmkuhl and Ruggiero, 1991)

Forest interior species -- Species that are adapted to living in the interior of an extensive forest

Forested land -- Land at least 10 percent occupied by forest trees of any size, or formed having had such tree cover and not currently developed for nonforest use Lands developed for nonforest use include areas for crops, improved pasture, residential, or administrative areas, improved roads of any width, and adjoining road clearing and power line clearing of any width

Forest Plan -- Source of management direction for an individual Forest specifying activity and output levels for a period of 10 to 15 years Management direction in the Plan is based on the issues identified at the time of the Plan's development

Forest System Roads -- Roads that are part of the Forest development transportation system, which includes all existing and planned roads, as well as other special and terminal facilities designated as Forest development transportation facilities

Formally withdrawn from oil and gas leasing -- A formal withdrawal of lands is segregation of public lands from specific management activities by Acts of Congress or other types of administrative regulations subject to valid existing rights A number of National Forest System lands have been removed from oil and gas leasing as well as other mineral development as a result of Congressional Acts or other forms of withdrawal such as by the Department of Interior Such lands include designated wilderness areas, wilderness study areas, lands which are found to be suitable by the surface management agency for wilderness designation as identified by the Federal Onshore Oil and Gas Leasing Reform Act, as well as other specially classified lands

FORPLAN -- Acronym for the linear programming computer model used as the primary analysis tool for National Forest System land management planning

Fourth-order watershed -- A watershed drained by a network of stream segments, the largest segment being a fourth-order segment

Fragmentation -- Habitat fragmentation is a process that occurs wherever a large, contiguous habitat is transformed into smaller patches that are isolated from each other by a landscape matrix unlike the original This matrix can differ from the original habitat in either composition or structure The crucial point is that it functions as either a partial or total barrier to dispersal for species associated with the original habitat A clear threat to population viability is when the process of fragmentation occurs that isolates pairs and populations versus fragmentation within the home range of the individual pairs

Fry -- The life stage of salmonid fish species that refers to the juvenile fish that have not emerged from the gravel or have recently emerged

Fuel breaks -- Generally wide strips of land 60 to 1,000 feet in width on which native vegetation has been permanently modified so that fires burning into them can be more readily controlled Some fuel breaks contain firelines, such as roads, which can be quickly widened with hand tools or by burning out

Fuel continuity -- Degree or extent of continuous or uninterrupted distribution of fuel particles (surface or aerial) in a fuelbed, which affects a fire's ability to sustain combustion and spread

Fuel loading -- The volume of the available or burnable fuels in a specified area

Fuels -- The organic materials that will support the start and spread of a fire duff, litter, grass, weeds, forbs, brush, trees, and dead wood materials

Fuelwood -- Round, split, or sawed wood of general refuse material, which is cut into short lengths for burning as fuel

G

Game species -- Any species of wildlife or fish for which hunting seasons and bag limits have been established, and are normally harvested by hunters and fishermen

GAP Analysis -- Analysis used to establish short-term and long-term conservation priorities in the study of biological diversity Identification and classification of the various elements of biodiversity, then an examination of the existing and proposed systems of protected areas

Geographic Information System (GIS) -- An information processing technology to input, store, manipulate, analyze, and display spatial resource data to support the decision-making processes of an organization. Generally, an electronic medium for processing map information

Goal -- A concise statement that describes a desired condition to be achieved sometime in the future It is normally expressed in broad, general terms, and is timeless in that it has no specific date by which it is to be completed Goal statements form the principle basis from which objectives are developed (36 CFR 219 3)

Grass/forb -- An early forest successional stage during which grasses and forbs are the dominant vegetation

Groundwater -- Water within the earth that supplies wells and springs Specifically, water in the zone of saturation where all openings in soils and rocks are filled The upper surface level forms the water table

Group selection -- The cutting method that describes the silvicultural system in which trees are removed periodically in small groups and result in openings that do not exceed an acre or two in size This leads to the formation of an uneven-aged stand in the form of a mosaic of age-class groups in the same forest

H

Habitat - The natural environment of a plant or animal In wildlife management, the major components of habitat are considered to be food, water, cover, and living space

Harvest cut -- The removal of a stand of trees as a final cut in even-aged management or the removal of mature trees in uneven-aged management Regeneration encouragement is emphasized

Healthy Ecosystem -- An ecosystem in which structure and functions allow the maintenance of biological diversity, biotic integrity, and ecological processes over time

Heavy fuels -- Fuels of large diameter, usually 3 inches or more, like snags, logs, large branchwood and peat, which ignite and burn more slowly than fine fuels

Heritage resources -- Buildings, sites, areas, architecture, memorials, and objects having scientific, prehistoric, historic, or social values

Heterogeneity -- Composition from dissimilar parts

Hiding cover -- Vegetation capable of hiding 90 percent of a standing adult deer or elk at 200 feet or less Includes some shrub stands and all forested stand conditions with adequate tree stem density or shrub layer to hide animals a majority of overstory trees or shrubs must be at least six feet high In some cases, topographic features also can provide hiding cover

Historic property -- Any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register This term includes artifacts, records, and remains that are related to and located within such properties

Horizontal diversity -- The distribution and number of plant communities or successional stages across an area of land, the greater the number of communities, the higher the degree of horizontal diversity Also, the greater the amount of edge, the higher the degree of horizontal diversity

Human Dimension -- An integral component of ecosystem management that recognizes people are part of ecosystems, that people's pursuits of past, present, and future desires, needs and values (including perceptions, beliefs, attitudes and behaviors) have and will continue to influence ecosystems and that ecosystem management must include consideration of the physical, emotional, mental, spiritual, social, cultural, and economic well-being of people and communities.

Humus -- The more or less stable portion of the soil's organic matter that remains after the major portion of plant or animal residues have decomposed

Hydrophobic -- Water repellent, having little or no affinity with water

HYSED Water Yield Sediment Model -- Computer model used to evaluate the water yield and sediment yield effects of proposed land management treatments Developed by Lee Silvey and Dave Rosgen, Region 2, U S Forest Service

I

Igneous -- Type of rock or mineral that solidified from molten or partly molten material.

Ignition -- The initiation of combustion

IMPLAN -- Acronym for the computer model used as an analysis tool to display social effects of various alternatives developed during the land management planning effort

Implementation -- Those activities necessary to respond to the approved land and resource management plan

Indicator species -- Those species identified in the planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish species, including *those species that are socially or economically important*

Indirect effects -- Results of an action occurring at a location other than where the action took place *and/or later in time, but in the reasonable foreseeable future Indirect effects may include growth-*inducing effects and other effects related to induced changes in the pattern of land use, population

density or growth rate, and related effects on air and water and other natural systems, including ecosystems

Individual-tree selection --The selection of trees for harvest based on individual-tree characteristics

Infrastructure -- The facilities, utilities, and transportation system needed to meet public and administrative needs

Inholdings -- Lands within the proclaimed boundaries of a national forest that are owned by a private citizen, an organization, or agency.

Insects and disease suppression -- Management practices applied to reduce insect and disease pest populations or damage, to limit spread, or to reduce susceptibility of hosts in imminent danger of being attacked

Instream flow -- The volume of surface water in a stream system passing a given point at a given time

Instream flow standards -- Channel flow required to allow good fisheries habitat

Intensive grazing management -- Management designed to maintain or increase the carrying capacity on an allotment There are significant investments in range improvements and/or complex grazing management systems are employed A deferred rotation grazing system on a sheep allotment with no range improvements is considered intensive grazing management

Intensity -- How hot a fire is Specifically a measure (in BTU's per foot per second) of the energy released per unit of time in an area of actively burning fire The amount of heat released per foot of fire per second

Interdisciplinary Team (ID Team) -- A group of individuals with different training assembled to solve a problem or perform a task The team is assembled out of recognition that no one scientific discipline is sufficiently broad enough to adequately solve the problem.

Intermediate harvest -- Any removal of trees from an even-aged stand between the time of its formation and the regeneration cutting

Intermittent road (Intermittent use road) -- A road developed and operated for periodic service and closed for more than one year between periods of use.

Intermittent stream -- A stream that flows only 50 to 90 percent of the year, when it receives water from some surface source such as melting snow A stream that does not flow continuously, as when water losses from evaporation or seepage exceed the available streamflow

Invertebrates -- An animal lacking a spinal column

Irretrievable -- Applies to losses of production, harvest, or uses of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost while an area is used as a road surface If the use is changed, timber production can be resumed The production lost is irretrievable, but the action is not irreversible

Irreversible -- Applies primarily to the use of nonrenewable resources, such as minerals or cultural resources, or to those factors that are renewable only over long time spans, such as soil productivity Irreversible also includes loss of future options.

K

KV funds -- In 1930, Congress passed the Knutson-Vandenberg Act (KV Act) to authorize collection of funds (KV Funds) for reforestation and timber stand improvement work on areas cut over by a timber sale

L

Land exchange -- The conveyance of non-Federal land or interests to the United States in exchange for National Forest System land or interests in land

Landscape -- An area composed of interacting ecosystems that are repeated because of geology, land form, soils, climate, biota, and human influences throughout the area Landscapes are generally of a size, shape, and pattern which is determined by interacting ecosystems

Landscapes -- Are relatively large areas that have similar and repeatable patterns of physical features, habitats, and human communities A good way to think of this is what you see when you look over the land from a vista point

Landscape composition -- In reference to spatial analysis, how much of each different landscape class (seral stage and cover type) is present in the total landscape scene being evaluated

Landscape configuration -- In reference to spatial analysis, how is each different landscape class (seral stage and cover type) arranged in the total landscape scene being evaluated

Landscape (used for silviculture) -- The primary unit of analysis for silviculture A landscape for purposes of silviculture is a diversity unit or an "Order IV" watershed

Landscape scale -- A heterogenous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout Landscapes vary in size, from many thousands of acres to only a few kilometers in diameter

Landslides -- The moderately rapid to rapid downslope movement of soil and rock that may or may not be water-saturated

Landtype Association -- Within a hierarchical framework, an ecological unit with similar geomorphic processes, geologic rock types, soil complexes, stream types, lakes, wetlands, and series, subseries, or plant association vegetation communities

Late-successional forest -- A stage of forest succession where the majority of trees are mature or overmature

Leasable minerals -- Those minerals or materials designated as leasable under the Minerals Leasing Act of 1920 They include coal, phosphate, asphalt, sulphur, potassium, sodium minerals, and oil and gas Geothermal resources are also leasable under the Geothermal Stream Act of 1970

Lease -- A legal contract that provides for the right to develop and produce oil and gas resources for a specific period of time under certain agreed-upon terms and conditions

Lease modification -- *Fundamental change to the provisions of a lease stipulation, either temporarily* or for the term of the lease A modification may include an exemption from or alteration to a

stipulated requirement Depending on the specific modification, the stipulation may or may not apply to all other sites within the leasehold to which the restrictive criteria applied.

Lease Notice -- Provides more detailed information concerning limitations that already exist in law, lease terms, regulations, or operational orders A Lease Notice also addresses special items the lessee would need to consider when planning operations, but does not impose new or additional restrictions Lease Notices attached to leases should not be confused with Formal Information Notices or Notice to Lessee

Lease stipulations -- Additional specific terms and conditions that change the manner in which an operation may be conducted on a lease, or that modify the lease rights granted

Leasehold -- The area described in a federal oil and gas lease

Lessee -- A person or entity holding record title in a lease issued by the United States

Litter -- A surface layer of loose organic debris, consisting of freshly fallen or slightly decomposed organic materials

Local roads -- Roads that connect terminal facilities with collector roads, arterial roads, or public highways May be developed for either short-term or long-term service

Locatable minerals -- Minerals or materials subject to claim and development under the Mining Law of 1872, as amended Generally includes metallic minerals such as gold and silver, and other materials not subject to lease or sale, like some bentonites, limestone, talc, some ziolites, etc

Local roads -- Roads that connect terminal facilities with collector roads, arterial roads, or public highways May be developed for either long- or short-term service

Long-term effects -- A relative indicator as to the duration of an impact or change, the effects last longer than the period of time that is considered reasonable for recovery An effect is long term when it persists through or beyond the natural lifetime of an individual

M

M -- 1,000 units (thousands)

Maintenance -- The upkeep of the entire Forest Development Transportation Facility, including surfaces and shoulders, parking and side areas, structures, and such traffic control devices as are necessary for its safe and efficient use (36 CFR 212 1) Maintenance is not for the purpose of upgrading a facility, but to bring it to the originally constructed or subsequently reconstructed conditions

Management area -- An area that has common direction throughout that differs from neighboring areas. The entire Forest is divided into management areas Each is described, and policies and prescriptions relating to their use are listed A management-area prescription provides the direction for the management area

Management-area prescription -- Management practices and intensity selected and scheduled for application on a specific area to attain multiple use and other goals and objectives (36 CFR 219 3)

Management concern -- An issue, problem, or a condition that constrains the range of management practices identified by the Forest Service in the planning process (36 CFR 219.3)

Management direction -- A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them (36 CFR 219 3)

Management Indicator Species -- Plant or animal species or habitat components selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important

Management practice -- A specific activity, measure, course of action or treatment and associated costs designed to obtain different levels of goods and services

Mass movement -- Down-slope unit movement of a portion of the land's surface A single landslide or the gradual, simultaneous downhill movement of the whole mass of loose earth material on a slope face.

Mature closed canopy -- This term applies to structural stages 4c and 5. Structural stage 5 refers to dense old growth rather than park-like stands Ponderosa pine in structural stage 4c has the following characteristics age ranges from approximately 80 to 160 years, the diameter at breast height can range from 8 to 20 inches, and canopy cover will be greater than 70 percent

Mature timber -- Trees that have attained full development, particularly in height, and are in full seed production

Maximum Modification (MM) -- A scenic resource management objective in which management activities may dominate the landscape characteristic When viewed as background they should appear natural In middleground or foreground they may not completely blend in Introduced structures should remain subordinate Contrast reduction should be completed within five years

MBF -- One thousand board feet of timber

Memorandum of Understanding (MOU) -- A legal agreement between the Forest Service and other agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project A MOU is not a fund-obligating document

Middleground -- A term used in scenery management to describe the portions of a view extending from the foreground zone out to 3 to 5 miles from the observer

Migration routes -- Routes followed by an animal species during periods of annual movement *usually between summer and winter ranges*

Mineral development -- The activities and facilities associated with extracting mineral deposits

Mineral entry -- Claiming public lands administered by the Forest Service under the mining Law of 1872 for the purpose of exploiting minerals May also refer to mineral exploration and development under the mineral leasing laws and Material Sale Act of 1947

Mineral estate (mineral rights) -- *The ownership of minerals, including rights necessary for access,* exploration, development, mining ore dressing, and transportation operations

Mineral Potential -- The classification of lands according to the probability of undiscovered mineral resources, delineated as to the type of mineral, the extent of the expected deposit, and the likelihood of its occurrence The likelihood of occurrence for oil and gas is classified as follows:

High Potential - Describes geologic environment that is highly favorable for discovering oil and gas resources The area is on or near a producing field and evidence exists that the geologic conditions of reservoir, source, and trap necessary for the accumulation of oil and gas are present

Moderate Potential - Refers to environment that is favorable for the occurrence of undiscovered oil and gas resources, however, one of the geologic conditions necessary for the accumulation of oil or gas may be absent

Low Potential - Refers to an environment that is not favorable for the accumulation of oil and gas as indicated by geologic, geochemical, and geophysical characteristics. Evidence exists that one of the geologic conditions necessary for the accumulation of oil or gas is absent

Unknown Potential - Refers to a region for which geologic information is insufficient to otherwise categorize potential This category should be limited to specific areas for which there is a true lack of data and should not be used as a substitute for performing the interpretation

Mineral Withdrawal -- The exclusion of locatable mineral deposits from mineral entry on areas required for administrative sites by the Forest Service, and other areas highly valued by the public Public lands withdrawn from entry under the General Mining Laws and/or the Mineral Leasing Laws

Minimum stocking standard -- The stocking that must be present on regenerated areas before a new stand can be considered established Minimum stocking is normally stated in terms of number of trees per acre and tree-stem heights by species

Mining Law of 1872 -- Provides for claiming and gaining title to locatable minerals on public lands Also referred to as the "General Mining Laws" or "Mining Laws "

Mitigate -- To offset or lessen real or potential impacts of effects through the application of additional controls or actions Counter measures employed to reduce or eliminate undesirable or unwanted results

MM -- 1,000,000 units

MMBF -- 1,000,000 board feet of timber

Modification (M) -- A description in scenic quality objectives when activities may dominate, but must use naturally established form, color, and texture These areas should appear natural when viewed in the background

Monitoring and Evaluation -- The evaluation, on a sample basis, of Forest Plan management practices to decide how well objectives are being met, and how closely management standards and guidelines have been applied

Moraine -- A ridge, mound, or irregular mass of boulders, gravel, sand and clay, carried in or on a glacier

Multiple-Use -- The management of all the various renewable surface resources of the National Forest System so that they are utilized in the combination that will best meet the needs of the American people Making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in the use to conform to changing needs and conditions That some lands will be used for less than all of the resources Harmonious and coordinated management of the various resources, each with the

other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output (36 CFR 21 9.3)

Mycelium -- A mass or mat of fungal threads

N

National Environmental Policy Act (NEPA) -- A 1969 act declaring a national policy that encourages productive and enjoyable harmony between humankind and the environment, to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality (The Principal Laws Relating to Forest Service Activities, Agriculture Handbook #453, USDA, Forest Service, 359 pp) The NEPA process is an interdisciplinary process which concentrates decision-making around issues, concerns, alternatives, and the effects of alternatives on the environment

National Fire Management Analysis System (NFMAS) -- A broad umbrella process to help fire managers identify the most efficient fire program meeting the direction in the Forest Plan This includes information for the planning record on program composition, annual programmed costs, emergency firefighting costs, expected resource impacts, and net value change

National Forest Management Act (NFMA) -- A law passed in 1976 as an amendment to the Forest and Rangeland Renewable Resources Planning Act, requiring the preparation of Regional Guides and Forest Plans, and the preparation of regulations to guide that development

National Forest System (NFS) land -- Federal lands that have been designated by Executive Order or statute as National Forest, National Grasslands, or Purchase Units, or other lands under the administration of the Forest Service

National Register of Historic Places (NRHP) -- A list of heritage resources that have local, state, or national significance maintained by the Secretary of the Interior

Net public benefits -- An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple use and sustained yield (36 CFR 219 3)

Noncommercial species -- Tree species of small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products

Nonforested land -- Land that has never supported forests and lands formerly forested where use for timber utilization is precluded by development for other uses Nonforest land is classified as land not suited for timber production

Nonmotorized activities -- Activities that do not incorporate the use of a motor, engine, or other nonliving power source This includes such machines as aircraft, hovercraft, motorboats, automobiles, motor bikes, snowmobiles, bulldozers, chainsaws, rock drills, and generators

Nonpoint-source pollution -- Pollution whose source is general rather than specific in location

No Surface Disturbance -- Defined on a case-by-case basis when the activity plan for an area is developed In general, an activity would be allowed if it would not interfere with the management objectives of the area

No Surface Occupancy (NSO) -- A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the land surface to protect special values or uses The NSO stipulation includes stipulations that may have been worded as "No Surface Use/Occupancy," "No Surface Disturbance," "Conditional NSO" and "Surface Disturbance or Surface Occupancy Restriction by location " Lessee may exploit the oil and gas or geothermal resources under leases restricted by this stipulation through use of directional drilling from sites outside the NSO area

Notice of Intent (mining) -- Written notice to the affected Ranger District by those who intend to engage in mining activity on the Forest, of proposed prospecting, exploration, mining and mineral processing activities

O

Obliteration -- Return a road or trail to production That means the road or trail will no longer be used or planned for future use as a travel way and will be stabilized and used to produce the same product as the adjacent areas It blots the road or trail out over time or removes the illusion that the road or trail is to be used as a travel way

Off-Highway Vehicle (OHV) -- Any motorized vehicle capable of or designed for travel on or immediately over land, water, or other natural terrain It includes, but is not limited to, four-wheel drive or low-pressure-tire vehicles, motorcycles and related two-wheel vehicles, amphibious machines, ground-effect or air-cushion vehicles

Old growth -- The overstory is dominated by late seral or climax species (age 200+ for softwoods, 100+ for hardwoods and aspen), but scattered pioneers are common

Old-growth habitat -- Habitat for certain wildlife that is characterized by late-successional forest stands with large snags and decaying logs

Outputs -- The goods, end products, or services that are purchased, consumed or used directly by people Goods, services, products, and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives

Overstory -- That portion of a plant community consisting of the taller plants on the site, the forest or woodland canopy

P

Partial Retention (PR) -- A description in scenic condition objectives when management activities remain visually subordinate to the characteristic landscape Repetition of line, for, color, and texture is allowed, but changes in qualities, size, amount, intensity, direction, and pattern should remain subordinate New contrast may be introduced but should remain subordinate as well Reduction in contrast should accomplished within one year of project completion

Patented Claim -- A claim for which title has passed from the federal government to the mining claimant under the Mining law of 1872

Payments in Lieu of Taxes (PILT) -- A law that provides compensation to counties for loss of county tax revenue from federal (nontaxable) land within their boundaries Payments are based on the acreage of federal land within each county Payments must be authorized annually by Congress and are distributed through the Department of Interior, Bureau of Land Management.

Payments to States (25-Percent Fund) -- A law that provides 25 percent of the gross receipts from the sale of timber, grazing, recreational activities, and other uses on USDA-Forest Service System lands, which are returned to states to be used for roads and schools in the counties where the lands are located Each county's share of the 25-Percent payment is based on the percentage of National Forest System acreage within that county

Peak flow -- The highest discharge of water recorded over a specified period of time at a given stream location Often thought of in terms of spring snowmelt

Perennial streams -- Streams which normally flow throughout the year.

Persons-At-One-Time (PAOT) -- A recreational capacity measurement term indicating the number of people who can use a facility or area at one time Equal to five persons per family unit for camp and picnic grounds.

Pioneer species -- A plant capable of invading bare sites (newly exposed soil surface) and persisting there, i e , "colonizing" them, until supplanted

Planning period -- One decade. The time interval within the planning horizon that is used to show incremental changes in yields, costs, effects, and benefits

Planning records -- A system that records decisions and activities which result from the process of developing a Forest Plan, Revision, significant amendment, Environmental Assessment or Environmental Impact Statement

Plant associations -- A grouping of plants that have reached dynamic equilibrium with the local environmental conditions and is equivalent to climax On site there is no evidence of replacement by other dominant plant species and there is no evidence of serious disturbance

Plant community -- Any assemblage of plants which occur in the same area and form a distinct ecological unit

Point-source pollution -- Pollution whose source is specific rather than general in location For example, particulate matter emanating from a specific smoke stack or sediment entering a stream from a specific bridge construction site

Pole timber -- Growing stock trees of commercial species 5 to 8 inches diameter, 4 5 feet above ground

Population viability -- Ability of a population to sustain itself

Precambrian -- Period of geologic time extending from more than 3,600 to about 570 million years ago

Precommercial thinning -- *The selective felling or removal of trees in a young stand, conducted to* accelerate diameter growth on remaining trees, maintain a specific stocking density, and improve vigor and quality or remaining trees, conducted at an age before the trees are commercially *merchantable*

Preferred alternative -- The alternative recommended for implementation in the Forest Plan based on the evaluation completed in the planning process

Preparation cut -- The removal of trees near the end of a rotation to open the canopy and enlarge the crowns of seed bearers to improve conditions for seed production and natural regeneration Typical of a shelterwood method

Prescribed burn or Prescribed Fire -- Fire burning under conditions specified in an approved plan to dispose of fuels, control unwanted vegetation, stimulate growth of desired vegetation, change successional stages, etc , to meet range, wildlife, recreation, wilderness watershed, or timber management objectives Prescribed burns occur under specified environmental conditions that allow the fire to be confined to a predetermined area and produce the fireline intensity and rate of spread required to meet the management objectives

Prescription -- Management practices selected and scheduled for application on a specific area to attain goals and objectives

Present Net Benefit (PNB) Present (current) value of all benefits discounted to the present

Present Net Value (PNV) The difference between the discounted value (benefits) of all outputs to which monetary values or established market prices are assigned and the total discounted costs of managing the planning area (36 CFR 219 3)

Preservation (P) -- A scenic condition objective in which only ecological changes are allowed Management activities, except for low impact recreation facilities are prohibited This objective applies mainly to wilderness, primitive areas, and areas with special classifications Also, a technique of conservation that maintains the resource in or on the ground into perpetuity

Presuppression -- Activities required in advance of fire occurrence to ensure an effective suppression action It includes 1) recruiting and training fire forces, 2) planning and organizing attack methods, 3) procuring and maintaining fire equipment, and 4) maintaining structural improvements necessary for a fire program

Primitive roads -- Roads constructed with no regard for grade control or designed drainage, sometimes by merely repeatedly driving over an area These roads are of single lane, usually with native surfacing and sometimes usable with 4-wheel-drive vehicles only

Productive -- The ability of an area to provide goods and services and sustain ecological values

Program Budget -- A plan that allocates annual funds, work force ceilings, and targets among agency management units

Proposed action -- In terms of the National Environmental Policy Act (NEPA), the project, activity, or decision that a Federal agency intends to implement or undertake, which is the subject of an environmental impact statement or environmental assessment

Public access -- Usually refers to a road or trail route over which a public agency claims right-of-way for public use

Public participation -- Meetings, conferences, seminars, workshops, tours, written comments, responses to survey questionnaires, and similar activities designed and held to obtain comments from the public about Forest Service planning

R

Range allotment -- A designated area of land available for livestock grazing upon which a specified number and kind of livestock may be grazed under a range allotment management plan. It is the basic land unit used to facilitate management of the range resource on National Forest System lands administered by the Forest Service

Range condition -- The state of the plant community on a range site in relation to the potential natural community or the desired plant community for that site. It is usually rated in the general category of satisfactory or unsatisfactory.

Range of Natural Variability (also known as Natural Variability, Historic Variability, Range of Variability) -- The spectrum of conditions possible in ecosystem composition, structure, and function considering both temporal and spatial factors

Ranger District -- Administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor

Reasonable Foreseeable Development (RFD) -- A projection of likely exploration, development and production within a study area based on existing and credible geologic data, technology, economics, and activity trends

Reclamation -- Returning disturbed lands to a form and productivity that will be ecologically balanced and in conformity with a predetermined land management plan

Reconstruction -- Activities performed on an existing road or other facility to restore it to a specified standard

***Record of Decision* (ROD)** -- A document prepared as a public Record of Decision in cases requiring an environmental impact statement

Recreation Opportunity Spectrum (ROS) -- Allocations that identify a variety of recreation experience opportunities categorized into eight classes on a scale from primitive to urban Each class is defined in terms of the degree to which it satisfies certain recreation experience needs, based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use The eight classes are

Primitive -- Very high probability of experiencing solitude, self-reliance and challenge, natural landscape with natural processes allowed to function, very low interaction between users, restrictions and controls not evident, access limited and generally cross-country travel.

Unroaded Backcountry -- Good probability of experiencing solitude, self-reliance and challenges, natural primitive landscapes, some evidence of users, minimum subtle controls, access by low standard trails and cross-country travel, natural processes allowed to function with subtle vegetative alterations

Backcountry Motorized -- Moderate probability for self-reliance and experiencing solitude away from travelways (roads/trails), risk associated with motorized equipment, predominately natural landscapes, low concentration of users and interaction by users along travelways, minimum but subtle restrictions, vegetative alterations visually blend with the landscape

Modified Roaded -- Low opportunity to avoid other users, little opportunity for risk or challenge, substantial modified landscapes, moderate evidence and interaction of users,

controls and restrictions present; variety of motorized users and access; various shapes and sizes of vegetative alterations which blend with the landscape

Rural -- Good opportunity to affiliate with others, facilities important, self-reliance of little importance, altered landscapes but attractive, high interaction among users, obvious and prevalent controls, extensive motorized use, vegetation maintained

Urban -- Opportunity to affiliate with others important, outdoor skills associated with competitive events; landscapes extensively changed with dominant structures; large numbers of user interactions, intensive controls are numerous, motorized use prevalent including mass transit, vegetation planted and maintained

Recreation Visitor Day (RVD) -- Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons

Reforestation -- Reestablishment of a tree crop on forested land

Regeneration -- The renewal of trees or shrubs whether by natural or artificial means

Region -- An administrative unit within the National Forest System The United States is divided into nine geographic regions Each region has a headquarter's office and is supervised by a Regional Forester The Rio Grande National Forest is in Region 2 The Regional Office is in Denver, CO

Rehabilitation -- 1) Actions taken to protect or enhance site productivity, water quality, or other values for a short period of time 2) A short-term scenic condition objective used to restore landscapes containing undesirable visual or other resource impacts to the desired scenic or other acceptable quality level

Removal cut (final cut) -- The removal of the last seed bearers or shelter trees after regeneration is considered to be established under a shelterwood method

Research Natural Area (RNA) -- Designated areas of land established by the Chief of the Forest Service under 36 CFR 251 23 for research and educational purposes and to typify important forest and range types of the Forest, as well as other plant communities that have special or unique characteristics of scientific interest and importance

Responsible Official -- The Forest Service employee who has the delegated authority to make a specific decision For example, the Regional Forester will select the preferred alternative for the Forest Plan

Restoration -- Actions taken to modify an ecosystem in whole or in part to achieve a desired condition

Retention (R) -- A scenic condition objective allowing for management activities which are not visually evident to the casual forest visitor Activities may only repeat line, form, color, and textures found in the characteristic landscape Reductions in form, line, color, and texture contrasts should be completed either during or after project completion

Revegetation -- The reestablishment and development of a plant cover This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of reforestation or reseeding

Rhizomorph -- A strand of fungal tissue that resembles a root.

Right-of-way -- Land authorized to be used or occupied for the construction, operation, maintenance, and termination of a project or facility passing over, upon, under, or through such land (36 CFR 251 51). The privilege that one person or persons particularly described may have of passing over the land of another in some particular line (FSH 2709 12 05 10)

Right-of-way corridor -- *A linear strip of land identified for the present or future location of* transportation or utility right-of-way within its boundaries

Rill erosion -- An erosion process during which numerous small channels several inches deep are formed Occurs mainly on bare soil

Riparian area -- Riparian areas consist of terrestrial and aquatic ecosystems These areas may be associated with lakes, reservoirs, estuaries, hotholes, marshes, streams, bogs, wet meadows, and *intermittent or permanent streams where free and unbound water is available This habitat is* transitional between true bottom land wetlands and upland terrestrial habitats, and while associated with water courses, may extend inland for considerable distances

Road corridor -- A strip of land between two points used by a road, or some future road whose exact location remains to be determined, usually with an indefinite width

Road density -- The number of road miles per square mile of land. (i e , 1 mile/square mile is 1 mile of road within a given square mile) This includes the total density of primary, secondary, and primitive roads.

Road maintenance level -- Defines the level of service provided by, and maintenance required for, a specific road, consistent with road management objectives and maintenance criteria (FSH 7709 58, section 12 3) The maintenance levels are

> **Maintenance Level 1** -- Assigned to intermittent service roads during the time they are closed to vehicular traffic The closure period is 1 year or longer Basic custodial maintenance is performed
>
> **Maintenance Level 2** -- *Assigned to roads open for use by high -clearance vehicles* Passenger car traffic is not a consideration
>
> **Maintenance Level 3** -- Assigned to roads open and maintained for travel by a prudent driver in a standard passenger car User comfort and convenience are not considered priorities
>
> **Maintenance Level 4** -- Assigned to roads that provide a moderate degree of user comfort and convenience at moderate travel speeds
>
> **Maintenance Level 5** -- Assigned to roads that provide a high degree of user comfort and convenience Normally, roads are double-laned and paved, or aggregate-surfaced with dust abatement

Rocky Mountain Region -- The Forest Service organizational unit consisting of Colorado, Wyoming, South Dakota, Nebraska, and Kansas Also called Region 2

Rotation -- *The planned number of years between the formation of a generation of trees and its* final cutting at a specified stage of maturity

Rural development -- The management of human, natural, technical, and financial resources needed to improve living conditions, provide employment opportunities, enrich the cultural life, and enhance the environment of rural America In the National Forest System, rural development is accomplished through partnerships

S

Saleable minerals -- Includes common varieties of sand, stone, gravel, pumice, pumicite, cinders, and clay In general, these minerals are widely spread and are relatively low in unit value They are generally used for construction materials and for road building purposes

Salvage harvest -- Removal of damaged, dead or dying trees, resulting from insect and disease epidemics, wildfire, or storms to recover timber before it loses its commercial value

Sanitation cutting -- The removal of trees occupied by insect or disease pests to reduce pest populations and limit the spread.

Saprophyte -- An organism that feeds upon dead organic matter

Saturated soils -- Soil condition during which all the spaces between soil particles are filled with water

Sawtimber - Trees that are 9-inch Diameter at Breast Height (DBH) or larger and can be made into timber

Scale -- The degree of resolution at which ecological processes, structures, and changes across space and time are observed and measured

Scarify -- To abrade, scratch, or modify the surface For example, to break the surface of the soil with a winged-ripper implement

Scenic Condition Objective (SCO) -- Measurable standards for scenic resource management based on the acceptable degree of alteration of the characteristic landscape The SCO's and their definitions are

> **Preservation** -- Provides for ecological changes only
> **Retention** -- Activities are not evident to the casual forest visitor
> **Partial Retention** -- Activities may be evident but must remain subordinate to the characteristic landscape
> **Modification** -- Activities may dominate, but must utilize naturally established form, color, and texture. These areas should appear natural when viewed in foreground or middleground situations

Scenic resource -- The composite of basic physiographic features and patterns, and land use effects that typify a land unit and influence the scenic appeal the unit may have for visitors

Scoping -- Determination of the significant issues to be addressed in an environmental impact statement

Sediment -- material suspended in water or that has been deposited in streams and lakes

Sediment base -- The baseline sediment expected for a stream without man-caused disturbances in the watershed An estimate based on the stream's classification

Sediment threshold -- The maximum amount of sediment that a particular stream can receive before it begins to experience detrimental changes in the channel shape An estimate based on the stream's classification

Seed-tree cutting - Removal in one cut of the mature timber from an area, except for a small number of seed bearers left individually or in small groups to provide seed for regeneration of the site

Seedling/sapling -- A forest successional stage in which trees are less than five inches in diameter

Selection-harvest cut -- Selection cutting is the periodic removal of mature trees individually or in small groups from an uneven-aged forest Individual-tree selection cutting involves the removal of selected trees of all size classes on an overstory canopy after each cut Group selection involves the removal of selected trees of all size classes in groups of a fraction of an acre up to 2 to 3 acres Regeneration occurs in the groups under conditions similar to those found in small clearcuts

Sensitive species -- Those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trends in (a) population numbers or density, or (b) habitat capability that would reduce a species' existing distribution (See Appendix A for further explanation)

Sensitivity level -- A measure of people's concern for the scenic quality of the National Forest Three sensitivity levels are employed, each identifying a different level of user concern for the visual environment

Level 1 -- Highest sensitivity
Level 2 -- Average sensitivity
Level 3 -- Lowest sensitivity

Seral -- A biotic community that is in a developmental, transitory stage in an ecological succession

Seral stage -- A phase in the sequential development of a climax community (Erhard, 11/94)

Shelterwood cutting -- A regeneration method under an even-aged silvicultural system. A portion of the mature stand is retained as a source of seed and/or protection during the period of regeneration The mature stand is removed in two or more cuttings commonly termed seed cutting *and removal cutting The seed cutting may or may not be preceded by a prepatory cutting*

Short-term effects -- A relative indicator as to the duration of an impact or change The effect is repairable within a reasonable period of time following the action

Shrub/seedling -- A forest successional stage in which shrubs and seedling trees are the dominant vegetation

Silvicultural treatment -- A *management practice that uses a method of tree culture, harvest, or* replacement (see single-tree selection, shelterwood cutting, group selection, even-aged management, uneven-aged management, and clearcut)

Silviculture -- The art and science of growing and tending forest vegetation, i e , controlling the establishment, composition, and growth of forests, for specific management goals

Single-tree selection -- A cutting method to develop and maintain uneven-aged stands by removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand

Size class -- For the purpose of Forest planning, size class refers to the three intervals of tree-stem diameter used for classification of timber in the Forest Plan data base:

-- less than 5-inch diameter = seedling/sapling

-- 5- to 8-inch diameter = pole timber
-- greater than 8-inch diameter = sawtimber

Skidding -- Moving logs by sliding from stump to a collecting point

Slash -- Woody material left after logging, pruning, thinning, brush cutting, or other management activities and/or accumulating there as a result of storm, fire, or other damage

Slope -- The amount or degree of deviation from the horizontal or vertical

Snag -- A standing dead tree

Snag-dependent species -- See cavity nester

Soft snags -- A snag composed primarily of softwood in advanced stages of decay and deterioration, particularly in the sapwood portions

Softwood -- A conventional term for timber and trees belonging to the evergreen group, such as pine, spruce, and fir

Soil compaction -- A physical change in soil properties that results in a decrease in porosity and an increase in soil-bulk density and strength

Soil productivity -- The capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities Soil productivity may be expressed in terms of volume or weight/unit, area/year, percent plant cover, or other measures of biomass accumulation

Soil surveys -- The systematic examination, description, classification, and mapping of soils in an area

Spatial -- Referring to the distance, interval, or area between or within things

Special-use permit -- A permit, term permit, lease, or easement that allows occupancy or use rights or privileges on National Forest System lands

Species -- Organisms that successfully reproduce among themselves and cannot reproduce successfully with other organisms

Stand -- A community of trees or other vegetation sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities which form a silvicultural or management entity

Standards and Guidelines (S&G's) -- Principles specifying conditions or levels or environmental quality to be achieved

Stewardship -- Caring for the land and associated resources and passing healthy ecosystems to future generations

Stipulation -- A provision that modifies standard lease rights and is attached to and made a part of the lease

Structural diversity -- Variety in a forest stand that results from layering or tiering of the canopy, an increase in layering that leads to an increase in structural diversity

Structural stages -- Any of several developmental stages of tree stands described in terms of tree age and the extent of canopy closure they create Although successional stages may be defined in any ecosystem, structural stages are usually defined only in coniferous or other forested ecosystems in which five stages can be seen grass/forb, shrub/seedling, sapling/pole, mature, and old growth

Substrate -- The rock material varying in size from boulders to silt found in the bottom of rivers and streams

Successional stage (seral stage) -- The relatively transitory communities that replace one another during development to potential natural community

Suspended sediment -- The very fine soil particles that remain in suspension in water for a considerable period of time without contact with the stream or river channel bottom

Sustainability -- The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time

Sustained yield -- The amount of renewable resources that can be produced continuously at a given intensity of management

T

Tailings -- The parts or a part of any incoherent or fluid material separated as refuse or separately treated as inferior in quality or value The sand, gravel, and cobbles that pass through the sluices in hydraulic mining were formerly designated as tailings, but of late they have been called mining debris or simply debris

Talus -- The loose accumulation of fragmented rock material on slopes, especially at the base of a cliff

Tentatively suitable timber land -- Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture, or the Chief of the Forest Service, (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity or watershed conditions, (c) existing technology and knowledge, as reflected in current research and experience provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest, and (d) adequate information is available to project responses to timber management activities

Terrestrial ecosystems -- *Plant communities that are not dependent on a perpetual source of water* to grow

Terrestrial fauna -- Pertaining to animals living on the ground

Thinning -- The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight Thinning may also be done to change the characteristics of a stand for wildlife or other purposes Precommercial thinning is removing trees that are too small to make a merchantable product and commercial thinning is removing trees that have reached sufficient size to be manufactured into a product -- both types of thinning improve tree spacing and promote more rapid growth

Threatened and Endangered Species -- *An endangered species is one which is in danger of* extinction throughout all or a significant portion of its range A threatened species is one which is

likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

Three-step shelterwood -- An even-aged silvicultural system that provides a source of seed and/or protection for regeneration The old crop (shelterwood) is removed in three successive shelterwood cuttings usually termed preparation, seed, and overstory removal cuts.

Threshold -- The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system

Tiering -- Covering general matters in broad environmental impact statements with subsequent, narrow statements, or environmental analyses incorporating by reference the general discussions and concentrating solely on the issues specific to the statement prepared

Till -- Glacial drift consisting of an assorted mixture of clay, sand, gravel, and boulders

Timber base -- The lands within the Forest capable, available, and suitable for timber production

Timber classification -- Forested land is classified under each of the land management alternatives according to how it relates to the management of the timber resource The following are definitions of timber classifications

> **Nonforested** -- Land that has never supported forests and land formerly forested where use for timber production is precluded by development or other uses
> **Forested** -- Land at least 10-percent stocked (based on crown cover) by forest trees of any size, or formerly having had such tree cover and not currently developed for nonforest use
> **Suitable** -- Land to be managed for timber production on a regulated basis
> **Unsuitable** -- Forest land withdrawn from timber use by statute or administrative regulation (for example, wilderness) or identified as inappropriate for timber production in the Forest planning process

Timber-stand improvement (TSI) -- The elimination or suppression of the less desirable vegetation in favor of the more desirable tree growth It includes thinning, cleaning, weeding, and release cuttings.

Timber type -- A classification of forest land based upon the species forming a plurality (50 percent or more of the basal area) of live-tree stocking

Timing limitation (seasonal restriction) -- Prohibits surface use during specified time periods to protect identified resource values The stipulation does not apply to the operation and maintenance of production facilities unless the findings analysis demonstrates the continued need for such mitigation and that less stringent, project-specific mitigation measures would be insufficient

Tractor logging -- Any logging method that uses a tractor as the motive power for transporting logs from the stumps to a collecting point, whether by dragging or carrying logs

Travel management -- Providing for safe, environmentally responsible, and customer-responsive movement of vehicles and people to and through public lands

Two-step shelterwood -- An even-aged silvicultural system that provides a source of seed and/or protection for regeneration The old crop (shelterwood) is removed in two successive shelterwood cuttings, usually termed seed and overstory removal cuts

Type conversion -- The conversion of the dominant vegetation in an area from one species to another

Tuff -- A fragmented rock consisting of the smaller kinds of volcanic particles

Turbid -- Water that is unclear or murky because of stirred up sediment

U

Unacceptable Modification -- A scenery management term for describing visual impacts that contrast excessively in form, line, color, or texture

Understory - That portion of a plant community growing underneath the taller plants on the site

Uneven-aged management -- The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes Cutting methods that develop and maintain uneven-aged stands are single-tree and group selection. (36 CFR 219 3)

Unroaded area -- The remaining portion of a roadless area that was studied and evaluated in the Forest Plan, where the characteristics of the natural forest have not been altered by human activities such as road construction and timber harvest

Unsuitable land -- Forest land withdrawn from timber utilization by statute or administrative regulation, or identified as not appropriate for timber production, i e , irreversible soil loss and nonreforestable within 5 years

V

Variety Class -- Determined by classifying different degrees of variety in a landscape A determination is made on a landscape's importance based on scenic quality. Those landscapes with the most diversity have the greatest potential for scenic value In order of importance the classes are

Class A - Those areas that have outstanding or unusual landforms, vegetation, water features, or rock formations

Class B - Areas that have a variety of features but tend to be common and are not outstanding

Class C - Areas where features have little change in line, form, color, or texture

Vertical Diversity -- The diversity in an area that results from the complexity of the above-ground structure of the vegetation, the most tiers of vegetation or the more diverse the species makeup, or both, the higher the degree of vertical diversity

Viable population -- A population of plants or animals large enough and distributed in such a way as to ensure their continued existence, despite all the hazards to survival such as illness, predators, old age, etc throughout its existing range within the planning area

Visual Absorption Capability (VAC) -- *The relative ability of a landscape to accept management* activities without affecting its visual character The capability to absorb visual change A prediction of how difficult it will be for a landscape to meet recommended SCOs

W

Waiver (mining) -- Permanent exemption from a lease stipulation

Watershed -- An area of land with a characteristic drainage network that contributes surface or ground water to the flow at that point, a drainage basin or a major subdivision of a drainage basin

Water yield -- The measured output of surface water, usually measured in acre-feet

Wetlands -- Lands where saturation with water is the primary factor determining the nature of soil development and the kinds of plant and animal communities living under or on its surface Wetlands generally include swamps, marshes, bogs, wet meadows, river overflows, mud flats, and natural ponds

Wild and Scenic Rivers -- Rivers or sections of rivers designated by Congressional actions under the 1968 Wild and Scenic Rivers Act, as wild, scenic, or recreational by an act of the legislature of the state or states through which they flow They are free-flowing streams free of impoundments with varying degrees of accessibility and shoreline development with outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, heritage, or other similar values, to be preserved for the benefit of present and future generations. Wild and scenic rivers may be classified and administered under one or more of the following categories

> **Wild river:** Rivers or sections of rivers that are free of impoundments with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads
>
> **Scenic river.** Rivers or sections of rivers that are free of impoundments, with watersheds still largely undeveloped, but accessible in places by roads.
>
> **Recreational river:** Rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past

Wildcat well -- A well drilled in unproven territory

Wilderness -- All lands included in the National Wilderness Preservation System by public law, generally defined as undeveloped federal land retaining its primeval character and influence without permanent improvements or human habitation

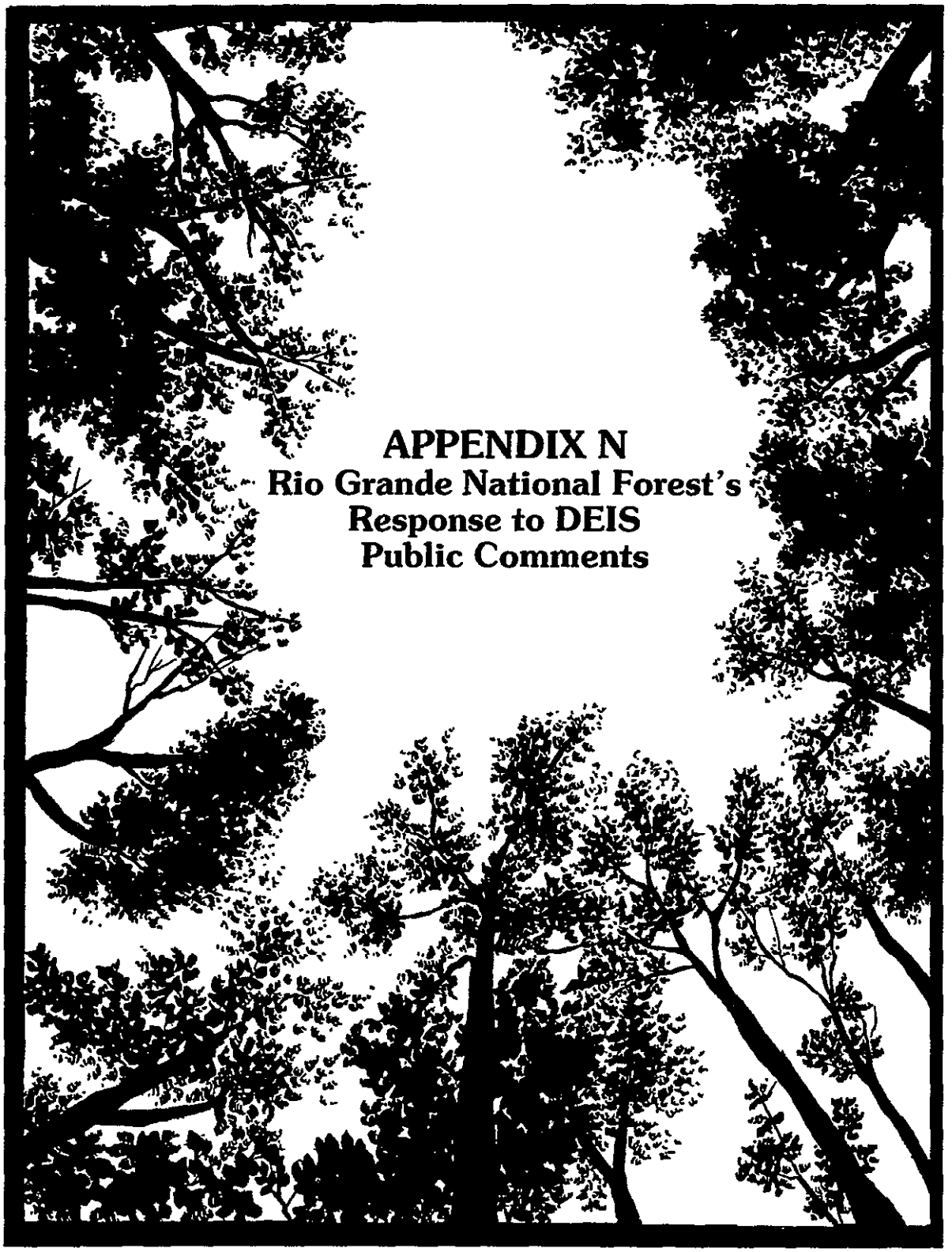
Wildfire -- Any wildland fire not designated and managed as a prescribed fire within an approved prescription All wildfires will be given an appropriate suppression action

Wildlife tree -- A tree at least 10 inches DBH and 18 feet tall that serves as a source of shelter or food for any given wildlife species, including damaged live trees

Windthrow -- The act of trees being uprooted by the wind

Winter range -- An area used by deer and elk during the winter months, usually at lower elevation and/or south and west exposures

Withdrawal -- An action which restricts the use of public land and segregates the land from the operation of some or all of the public land and mineral laws Withdrawals are also used to transfer jurisdiction of management of public lands to other federal agencies.



APPENDIX N
Rio Grande National Forest's Response to DEIS Public Comments

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APPENDIX N
Rio Grande Forest's Response to DEIS Public Comments

SUMMARY OF COMMENTS AND RESPONDENTS

The DEIS was released and mailed to the public on December 7, 1995 The Forest mailed over 800 copies of the Summary, Plan and/or EIS to the Public We really wanted to get all the public comments possible so the comment period was extended from the normal 90 days to 120 days to allow the public plenty of time to comment even with the holidays.

During this comment period the Forest received over 5,200 comments from 1,187 different respondents These comments came from 24 different states, with the predominant responses from Colorado(Table N-1)

Table N-1 Responses to DEIS by State

State	# of Responses	State	# of Responses	State	# of Responses
AZ	3 00	MD	1 00	NV	1 00
CA	3 00	MN	2 00	OH	2 00
CO	999.00	MT	1 00	OK	19 00
CT	1.00	NC	1 00	OR	1 00
FL	3 00	ND	1 00	SD	2 00
ID	4 00	NE	2 00	TX	14 00
IL	1 00	NH	1 00	UT	2 00
IN	1 00	NM	28 00	WY	2 00

Table N -2 Comments by Revision Topic

Nonspecific	1,948
Biological Diversity	1,027
Wilderness/Undeveloped Areas/Special Interest Areas	323
Timber Mgmt/Suitability	1,148
Recreation/ Travel Management	1,212
Oil and Gas Leasing	57

Number of Letters from Within Colorado by City

City	# of Letters
Alamosa	71
Antonito	43
Arvada	2
Aurora	4
Bayfield	1
Blanca	1
Boulder	51
Brighton	1
Buena Vista	1
Capulin	3
Carbondale	1
Center	19
Central City	1
Colorado Springs	9
Conejos	1
Conifer	2
Creede	29
Crescent Center	1
Crested Butte	2
Crestone	91
Del Norte	100
Delta	1
Denver	30
Dillon	1
Durango	20
El Jebel	1
Englewood	5
Fort Collins	3
Georgetown	1
Golden	4
Grand Junction	2
Greeley	1
Highlands Ranch	2
Hooper	2
Howard	2
La Jara	85
Lafayette	1
Lakewood	3
Larkspur	1
Leadville	1
Littleton	10
Longmont	2
Louisville	1
Manassa	124
Manitou Springs	4
Moffat	8
Monte Vista	60
Montrose	2
Mosca	2
Nederland	3
Norwood	1
Pagosa Springs	4
Palisade	1
Phippsburg	1
Pine	1
Pueblo	4
Romeo	88
Saguache	14
Salida	1
San Luis	1
Sanford	24
Saquache	2
Silverton	1
South Fork	28
Steamboat Springs	1
Tabernash	1
Thornton	1
Villa Grove	4
Woodland Park	2

Organizations Commenting

Adams State College
Albuquerque Anesthesia Consult
Assoc Of Ecosystem Research
Big "D" Saws & Cycles
Bighorn 4x4 Club
Biodiversity Associates
Biodiversity Legal Foundation
Blue Mesa Forest Products, Inc
Blue Ribbon Coalition, Inc
Board of County Commissioners
Boulder Energy Associates
Bristle Cone Pine Co
Broadacres Ranch
Carson Forest Watch Citizens'
CO Dept Of Natural Resources
CO Environmental Coalition
CO Motorized Trailriders Assoc
CO Off-hwy Vehicle Coalition
CO Outfitters Assoc -s central
CO Snowmobile Assoc , Inc
Colorado 500 Dirt Bike Organiz
Colorado Aggregate Co
Colorado Assoc Of 4 Wheel Drv
Colorado Bird Observatory
Colorado Division of Wildlife
Colorado Grizzly Project
Colorado Off Highway Veh Coal
Colorado State Parks
Colorado Timb Industry Assoc
Colorado Trail Foundation
Colorado Trout Unlimited
Consulting Fisheries Scientist
Continental Divide Trail Socty
Creede Jr/sr High School
Creede Timberwatch
Crescent Communications
CSU - Co Heritage Program
CSU - Entomology Faculty Assoc
CSU - Forest Sciences
CU Wilderness Study Group
Del Norte Chamber of Commerce
Duke City Lumber Company
Flying X Cattle Company, Inc
Forest Trust
Freemon's Guest Ranch
Grandview Cabins & Rv
Haynie Animal Clinic
Hermit Lakes Rec Ass , Inc
High Country Citizens' Allianc
Intermtn Forest Industry Assc
La Garita Llamas
Lifenet
Lumber Co
Manitou Foundation
Member of Congress
Mineral County Commissioner
Mock Realty
Monte Vista Eye Care Center
Mountain Valley Lumber
Napa Auto Parts
Outward Bound
People for the West
Pleasant Logging & Milling Inc
Public Service Company of Co
Rancho Del Oso Pardo, Inc
Resource Management Associates
Riding Vacations
Rio Grande Cty Commissioners
Rocky Mtn Oil & Gas Assoc
Romeo's Little Market
Saguache County Commissioner
San Francisco Creek Ranch
San Juan Citizens Alliance
San Luis Valley Cattlemen's
San Luis Valley Trout Unlmtd
Schmittel Packing & Outfitting
Shenkel Investments, Inc
Sierra Club - Mt Sopris Group
Sierra Club - Rcky Mtn & Wemin
Sierra Club-rachel Carson Grp
Sinapu
SLV Rural Electric Cooperative
Southern Utah Wilderness Allia
State Rep For District 60
Sthrn Rockies Ecosystem Project
Stone Forest Industries
Stone Valley Lumber
The Colorado Mtn Club
The Nature Conservancy
U S Dept Of the Interior
United States Dept Of Ag
Univ Of CO, Boulder
Univ Of Utah Research Fellow
University of Colorado
Vista Travel
Wilderness Defenders of Flc
Wilderness Ranch
Yale University Grad Student

CROSS REFERENCE - PUBLIC RESPONSES TO FOREST RESPONSES

The following is an alphabetical list of all respondents With each name is the *response code This code is the Forest's response to comments There were* almost 1,400 separate and unique responses to comments. The next section of this appendix is the responses, which are in numerical order

NO NAME
19 2, 19 5, 99, 20 5

NO NAME CO OUTFITTERS ASSOC -S.CENTRAL
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19 1, 99

ADAMS, DOUG
14 2, 99

ADAMS, PAUL W INTERMTN. FOREST INDUSTRY ASSC
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ALDRICH, DANIEL L
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ALEXANDER, ELDRED (MICKEY)
19 21

ALEXANDER, KELSEY M INTERMTN FOREST INDUSTRY ASSC
1 127, 1 2, 1 58, 1 62, 1 63, 1.64, 1 65, 1 66, 1 67, 1 68, 1 69, 1 70, 1 71, 1 72, 12 1, 12 29, 17 42, 17 75, 17 93, 18 10, 18 14, 19 44, 19 47, 20 15, 20 18, 20 19, 20 20, 20 21, 20 25, 20 26, 20 27, 20 28, 20 7, 20 8, 21 113, 21 121, 21 147, 21 148, 21 149, 21 150, 21 151, 21 152, 21 153, 21 154, 21 155, 21 156, 21 157, 21 158, 21 160, 21 161, 21 162, 21 163, 21.164, 21 165, 21 166, 21 167, 21 168, 21 169, 21 170, 21 171, 21 172, 21 173, 21 174, 21 175, 21 176, 21 177, 21 178, 21 179, 21 18, 21 180, 21 181, 21 182, 21 183, 21 184, 21 185, 21 186, 21 187, 21 188, 21 189, 21 190, 21 191, 21 192, 21 193, 21 194, 21 195, 21 196, 21 197, 21 198, 21 199, 21 200, 21 201, 21 202, 21 203, 21 204, 21 205, 21 206, 21 207, 21 208, 21 209, 21 210, 21 211, 21 212, 21 213, 21 214, 21 39, 21 58, 3 10 17, 3 10 24, 3 11 57, 3 2 20, 3 2 59, 3 3 10, 3 3 8, 3 3 9, 3 4 10, 3 4 8, 3 8 12, 3 9 1, 4 13, 4 30, 5 17, 6 1, 6 12, 6 23, 6 3, 6 8, 7 22, 7 75, 8 16, 8 25, 8 4, 8 7, 8 8, 9 41, 99, 21.221, 21 36

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AMMON CONDIE, NEIL
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ANDERSON, CARLTON
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ANDERSON, ROBERT CHARLENE
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ANDERSON, MARSHA
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ANDERSON, SAM
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BARY, RAYMOND
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BATES, J N JULIE
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BEAUDEAN, CINDY
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BECHAVER, SHEILA
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BECHAVER, EDWARD
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BECHAVER, MARK
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BECK, MICHAEL R
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BEIL, LAURA E
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ESPINOZA,
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GRIPPS, PAMELA L.
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GUYENON, BRIAN
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GYLLING, BETSY
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GYLLING, RACHEL
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GYLLING, JOANNA
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GYLLING, BETSY
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PENNER, DARCY MOUNTAIN VALLEY LUMBER
20 5

PEPPER, JEANEN
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PEPPER, KELLY
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PEREZ, JOSE
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PETERSON, RONALD
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PETERSON, MATTHEW
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PETERSON, LISA
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PICKELNER, SHEA
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PLEASANT, CORINNE PLEASANT LOGGING MILLING INC
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PLEASANT, RON PLEASANT LOGGING MILLING INC
3 1 1, 3 2 5

POAGE, RAYMOND ELIZABETH
12 7, 20 8, 3 2 5, 4 1, 4 26, 4 28, 4 66

POJAR, JOE
17 162, 21 60

POLLET, CARL CINDY
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POOL, DONNY
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PORTON, WILLIAM
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POUNDS, KYLE
1 2, 13 24, 19 1, 19 18, 19 6, 3 3 1, 4 3, 7 1, 99

POUNDS, KYLE WILDERNESS DEFENDERS OF FLC
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POVILITIS, TONY LIFENET
1 1, 1 13, 20 10, 20 5, 21 30, 3 10 3, 3 2 15, 3 2 5, 7 29

POWELL, MITCHELL
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POWELL, JAKE SALLY
1 5, 12 4, 13 37, 17 65, 19 6, 20 2, 3 3 1, 7 1, 7.16

PRENDERGAST, TONY
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PRENTICE, DEAN
19 5, 99

PREWITT, LAVELLE SAN FRANCISCO CREEK RANCH
1 11, 3 2 35, 7 2

PRILLWITZ, JEFF
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PULLEN, DOROTHY
12 11, 21 36

QUADRADO, JUDITH
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QUEZADA, MARIA
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QUINTANA, MANUAL
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QUINTANA, PETE STONE VALLEY LUMBER
20 5

RADFORD, CLAUDE
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RAGER, PAULA J
11 6, 11 7

RAYER, BILL
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REID, JUSTIN
17 165, 18 03, 21 89, 99

RELER, BUFF
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RENDORF, SUSAN
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RENGER, PH D , M D , HARTMUT ALBUQUERQUE ANESTHESIA CONSULT
17 30, 19 28, 99

RENHAULT, RON
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RENNER, JACOB
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RESENDIL, MAX
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RETUTA, JANE
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REYNOLDS, WILLIAM
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REYNOLDS, PHIL
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RICHMOND, PATRICIA JOY
1 16, 10 3, 12 12, 12 4, 18 01, 20 5, 21 10, 21 13, 21 42, 3 2 18, 3 2 5, 3 2 56, 3 3.1, 3 5 10, 4 1, 7 26, 99

RIGGENBACH, JAMES
12 7, 19 1, 19 22, 99

RIGGLE, DON COLORADO 500 DIRT BIKE ORGANIZ
17 198, 17 199, 19 17, 20 1, 99

RIGGLE, DON
19 1, 19 20, 19 23, 12 37, 17 122, 17 160, 19 1, 19 23, 19 37

RIVERA, GARY
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ROBERTSON, MARGY
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ROBIN, LOU ANN
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ROBINSON, ROBERT H
1 2, 12 1, 21 19, 3 10 2, 4 4, 99

ROBINSON, MICHAEL SINAPU
1 111, 12 102, 16 9, 19 2, 20 8, 21 39, 22 1, 22 3, 22 4, 22 5, 4 13, 4 4, 4 45, 4 5, 4 6, 6 20, 7 19, 7 21, 7 24, 8 1

ROBOTHAM, DOUGLAS M CO DEPT OF NATURAL RESOURCES
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RODER, KURT
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RODRIGUEZ, MICHAEL
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RODRIGUEZ, NATHAN
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RODRIGUEZ, DEMETRIO
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RODRIGUEZ PASTOR, SUE
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RODVOLD, TROY
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RODVOLD, PATTY
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ROGERS, KENNETH NATALIE
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ROGERS, KENNETH
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ROGERS, BOB
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ROGERS, TONI
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ROGERS, KENNETH W
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ROMERO, MITCHELL
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ROMERO, GABRIEL
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RONO, MARVIN
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ROSA JR , CALVIN
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ROSCAN, EDWARDO
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ROSE, JUDIE
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ROSENBERG, ROBIN N
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ROUNDS, KINDRA
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ROUNDS, DONNIE
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ROUSE, SHARON MOCK REALTY
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ROWLEY, JO ANNE
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ROXTON, ERIC
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RUDIN, DAVID
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RUE, TODD
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RUE, BRIAN
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RUE, ANDREA
20 5, 21 36

RUFF, DALE
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RUMILL, LARRY
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RUSS, WAYNE
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RUSSELL, KADYE
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RYKAUM, KELLY J
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SALAZAR, PAUL
17 68

SALAZAR, JEROME
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SALAZAR, FILIMO
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SALAZAR, TONY
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SALAZAR, BERTRUDE
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SALAZAR, BRYAN
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SALAZAR, TOM
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SALZMAN, RANDY
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SAME, VINCENT
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SAMORA, DAVID
20 5, 3 11 4

SAMPSON, JACK
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SANCHEZ, JIMMY LUMBER CO
20 5, 3 2 20, 3 2 5, 5 17

SANCHEZ, ERIC
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SANCHEZ, STEVE
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SANCHEZ, CAROL
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SANDERS, ROBERT L
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SANDIDGO, ROGER H
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SANDOVAL, DAVID
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SANDOVAL, GEORGE
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SANDOVAL, JOHN
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SANDOVAL, TED
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SANDSLOM, MARIANNE
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SANDSTROM-SMITH, PEARLE
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20 2, 21 39, 3 3 1, 99

SAUNDERS, JIM
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SCAR, DICK JAN
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SCHEFIELD, JOHN
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SCHEIBE, DON
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SCHMITTEL, VERNA SCHMITTEL PACKING OUTFITTING
11 6, 17 114, 20 5, 21 62

SCHOFIELD, MARK
19 1

SCHOFIELD, RANDY PEOPLE FOR THE WEST
11 1, 11 2, 21 36, 99

SCOTT, ROBERT
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SEASTEDT, TIM ASSOC OF ECOSYSTEM RESEARCH
1 41, 11 10, 11 9, 20 10, 20 5, 21 101, 21 102, 21 13, 3 11 13, 3.11 14, 3 2.53, 3 3 1, 3 4 6, 3 8 13, 4 29, 4 3, 4 5, 4 6, 6 16, 6 2

SEATON, MARK
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SELESTY, S
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SELLERS, VANO
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SHAW, REX
19 1, 99

SHAWCROFT, CHARLIE
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SHAWCROFT, JANNA
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SHAWCROFT, JAMES L
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SHAWCROFT, BRETT
21 36, 21 83, 21 84, 4 48, 4 5, 99

SHAWCROFT, JOHN
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SHAWCROFT, BRETT SAN LUIS VALLEY CATTLEMEN'S
1 123, 1.58, 1 77, 1 78, 1 79, 1 80, 1 81, 1 82, 11 25, 11 26, 11 27, 12 7, 14 5, 15 7, 15 8, 15 9, 17 17 22, 17 17 57, 17 22, 17 222, 17 23, 19 1, 19 2, 20 22, 20 8, 21 19, 21 216, 21 230, 21 231, 21 232, 21 26, 22 1, 22 3, 22 4, 22 5, 22 6, 23 1, 4 13, 4 16, 4 20, 4 27, 4.32, 4 33, 4 34, 4 35, 4 36, 4 37, 4 38, 4 4, 4 42, 4 5, 4 51, 4 53, 4 54, 4 55, 4 57, 4 7, 6 17, 6 9, 7 102, 7 18, 7 19, 7 69, 7 80, 7 81, 7 82, 7 83, 7 84, 8 1, 8 23, 8 25, 8 7, 8 8, 9 4, 99

SHELDRAKE, WAYNE
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SHENKEL, JEFFREY L SHENKEL INVESTMENTS, INC
17 187, 19 27, 21 10, 3 10 3, 3 2 18, 3 2 45, 3 3 1, 3 4 4, 3 8 1, 4 1, 99

SHEPHERD, DENNIS
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SHEPPERD, REX M CREEDE
TIMBERWATCH
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SHOOK, JEFF
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SHORT, DR JOHN A
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SIERRA, LUIS
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SIERRA, EUGENE
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SIGALA, HECTOR
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SIL, LARRY
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SIMPSON, GARY
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SIMS, KAREN CHARLIE
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SINDER, PAUL
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SINGLETON, DON
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SISNEROS, JOSEPH
21 36

SISNEROS, TONY STONE FOREST
INDUSTRIES
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SISNEROS, GEORGE
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SISNEROS, VERA
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SKALAEB, SHARON
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SKLNIK, SHARON
10 3, 10 9, 13 38, 7 26

SKOGLEND, MARY I
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SLATER, CHARLES CSU - ENTOMOLOGY
FACULTY ASSOC
21 26

SLINGERLAND, GLENN
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SLOAN, DOUG
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SLOKAR, ELIZABETH
1 109, 1 2, 13 14, 13 19, 13 24, 13 37, 13 5,
15 1, 17 36, 17 65, 17 97, 17 98, 19 2, 19 26,
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SMITH, JACOB
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SMITH, C W BESSIE
19 1, 19 2, 19 22, 9 6

SMITH, RYAN
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SMITH, DEBORAH KAY
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SMITH, STEPHEN
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SMITH, FRANK CAROL
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SMITH, RAY
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SMITH, TAMERA
19.2, 19.5, 99

SMITH, STEWART
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SMITH, CURTIS
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SMITH, JAMES
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SMITH, RACHAEL
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SMITH, ED
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STAUDER, JACK
13 1, 13 8, 19 2, 3 10 3, 3 3 1, 3 3 6, 4 1, 7 12, 99

STEFFENS, BILL
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STEFFENS, BRUCE
4 48, 99, 21 85, 21 86

STERN, JEFF
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STEWART, ROBERT F. U S DEPT OF THE INTERIOR
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STILL, DOUGLAS
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STILL, DOUGLAS
19 1, 19 2

STRNAD, FRAN
10 2, 13 30, 19 2, 19 5, 20 5, 21 29, 3 2 5, 3 31, 4 9, 7 27, 99

STUBBS, THOMAS M
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STUTSON, CAROLINE
13 24

SUGO, JOSE
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SULLIVAN, HARVEY JAN
12 7, 20 8, 3.2 5, 4 1, 4 26, 4 28, 4 66

SUTHERLAN, CHRISTINA
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SUTHERLAN, STEVE
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SWANSON, JOHN
12 1, 21 28, 14 4

SWANSON, JOHN R
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SWINEHART, DAVID
1.1, 12 45, 13 14, 21 18, 3 10 2, 3 2 45, 3 2 5, 99

SYLVESTER, THOMAS W COLORADO AGGREGATE CO
20 5, 21 26, 99

TAFOYA, LEON STONE FOREST INDUSTRIES
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TAFOYA, DANIEL
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TAFOYA, MANUEL
17 68, 20 5, 3 2 20, 99

TALBOT, EDWARD G SIERRA CLUB-RACHEL CARSON GRP
12 1, 13.24, 3 3 1, 7 20, 99

TARDONA, ROBERT
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TARDONA, NANCY
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TAYLOR, JENNIE
1 2, 12 1, 13 14, 13 19, 17 65, 19 26, 21 14, 3 10 3, 3 3 1, 4 4, 7 4

TAYLOR, BRUCE
19 1, 99

TAYLOR, SR , JOSE
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TEEM, LEROY LORI
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THOMAS, SHAWN
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THOMAS, KRISTIE
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THOMPSON, JAMES W
17 188, 19 1

THOMPSON OEN, DONALD R JAN
13 24, 17 168, 21 06, 3 3 1, 4 6, 99

TIBBITS, SHAWN
17 174, 99

TIBBITS, MIKE EVELYN
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TINGLE, SKEET WILDERNESS RANCH
17 112, 21.21

TIPPETT, J D
19 2, 19 5, 99

TORREZ, TIM MOUNTAIN VALLEY LUMBER
20 5

TRUJILLO, CHRIS
20 5, 5 17

TRUJILLO, JERRY
19 5, 20 5

TRUJILLO, GILBERT
20 5, 99

TRUJILLO, STEVE
20 5, 3 2 20

TRYON, DOUG
17 205, 19 1

TUCKER, TOM
99

TUTEN, WILLIAM LINDA
17 118, 19.2, 19 5, 21 20

TYUS, PH D , HAROLD CONSULTING FISHERIES SCIENTIST
1 15, 22.3, 7 16, 7 30, 7.32, 8 1, 8.12, 8 5

VALASQUEZ, HERMAN
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VALDEZ, DEMETRIO
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VALDEZ, SAM
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VALDEZ, VICTOR
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VALDEZ, SANDRA
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VALEZ, RAY
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VALVERDE, RUDY
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VAN PEPPER, MR MRS
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VANCE, CHERYL
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VANCE, BRIAN
19 1, 19 2, 20 5, 99

VANTREESE, CHARLIE
19 1, 19 2, 20 5, 99

VASQUEZ, JULIE
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VASQUEZ, SANDRA
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VASQUEZ, MARIA
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VAYAS, LOUIS L
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VELASQUEZ, JESS
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VELASQUEZ, STEPHEN
19 2, 20 5, 6 3

VELASQUEZ, DEBBIE
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VERBECK, GAYLE R
19 1, 7 6

VETA, JOSE
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VIALPANDO, R
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VICKERS, DIANE
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VICKERS, JAMES
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VICKERY, ANNE
1 110, 1 2, 1 99, 10 10 1, 10 3, 12 26, 13 17, 13 24, 13.25, 17 175, 17 197, 17 219, 17 30, 17 36, 17 57, 17 60, 17 88, 20 14, 20 15, 20 4, 20 8, 20 9, 21 151, 21 19, 21 226, 21 246, 21 260, 21 39, 21 58, 3 10 15, 3 3 12, 3 8 10, 3 8 9, 4 13, 4 24, 4 39, 4 4, 7 13, 8 1, 8 15, 8 21, 9, 9 44, 9 45, 9 46, 99

VIGIL, JOE
19 2, 20 5

VIGIL, GARY
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VIGIL, CHRIS
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VIGIL, JASON
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VIGIL, VELEENA
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VIGIL, MARIA DARLENE
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VIGIL, JESSE
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VIGIL, RUBY
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VIGIL, FRANCISO E
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VILLALOBOS, OSCAR
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VILLALOBOS, NICOLAS
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VONDED, MITCHELL
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W , BRYAN
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WADE, JOHN M
13 14, 13 19, 13 24, 17 65, 19 2, 3 3 1, 7 1,
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WALL, GARY DORETHA
10 3, 21 07, 99

WALTERS, THOMAS M
99

WASHBURN, LIZ
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WATKINS, KAY O
17 129, 21 11, 21 39, 7 26, 99

WATSON, KIRK
13 37, 17 160, 17 29, 17 67, 19 1

WEAVER, RICHARD
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WEAVER, RICHARD, KENNY, SIDNEY, SAM, C
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WEHLING, CAROL
13 1, 13 24, 19 26, 20 4, 3 2 45, 3 3 1, 4 8,
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WEINER, PH D COPELAND, JAY L REBA
INTERMTN FOREST INDUSTRY ASSC
17 103, 17 104, 17 77, 20 12, 20 15, 20.19,
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WEIS, JOYCE
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WEIS, JR , PAUL
1 14, 13 12

WEIS, JR , PAUL
13 14, 13 24, 13 5, 13 7, 3 3 1, 4 26, 7 5, 7 9

WELCH, JACK CO SNOWMOBILE ASSOC ,
INC
21 221

WHEELER, WARREN S
99

WHEELER, MARIE
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WHITE, TIMOTHY P
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WHITLEY, JAMES D CINDY A
19 2, 19 5, 20 1, 3.10 7, 3 2 35, 3 8 11

WHITNEY, RHODA
13 24

WHITNEY, TIM
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WHITNEY, JANA
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WIDGER, SHANE
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WIGHAM, CHAD
17 162

WILKINS, CHARLES
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WILLIAMS, DENNIS
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17 65, 3 3 1, 4 4, 4 6, 7 4, 7 5, 99

WILLIAMS,
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WILLIAMS, MARGERET
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WILSON, KATHY BIGHORN 4X4 CLUB
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WILSON, PAT
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WINTERS, TOMMY
20 5, 3 2 20

WINTERS, LORI
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WINTZ, ROD MINERAL COUNTY
COMMISSIONER
17 188, 19 2, 20 5, 21 10, 21 63, 3 10 2,
3 11 12, 3 2 45, 3 3 1, 3 8 1, 3 8 2, 4 21,
7 26, 7 27, 99

THE FOREST'S RESPONSE TO COMMENTS

1. Ecological Resources

1.1 **The following are general statements made in letters. Maintain natural, undisturbed forests. Promote biodiversity Protect biodiversity Protect all native species. Restore landscape connections. Reintroduce natural process Restore ecologic health. I want less use of the Forest. Develop a plan to protect all the elements of diversity (genetic, species, communities, and ecosystems) The Greater San Juan Ecosystem at present is not healthy Natural processes, such as fire regimes and population dynamics, should be emphasized Gave what little we know about biodiversity and how to preserve it, the highest and best use of the resource is to preserve as many options for the future as possible. Designate more Wilderness to protect biodiversity. Turn the RGNF into a Preserve. The Greater San Juan Ecosystem should be turned into a Biological (Biosphere) Preserve with the future determined generally by biologists who are free of industrial and political pressures.**

The intention of each Alternative was to provide for sustainable ecosystems See DEIS pages 2-17 to 18 for a quick summary of the key attributes used to make this determination The Biodiversity Assessment and the conclusions presented in Chapter Three of the DEIS form the basis for our determination We believe that the proposed activities, implemented with the Draft Plan's Standards and Guidelines, will provide for sustainable ecosystems on the RGNF

1.2 **The following are general statements about old growth that were provided in letters. Preserve old-growth forests. I'm concerned about the amount of old growth, retaining high quality old growth, and the distribution of old growth on the Forest. I would like to see an old-growth Management-area Prescription. I would like to see an old growth inventory using the Mehl (1992) descriptions. I don't like the use of Late-Successional Forests in place of Mehl's descriptions of old growth and it seems to overstate the amount of old growth. I'm concerned whether adequate old growth exists for old-growth dependent species. I'm concerned about connectivity of old growth across the landscape (both existing and recruitment) A map showing this connectivity or lack thereof would be helpful. Standard three (Draft Plan page III-6) is inadequate. There is very little true old growth left. The criteria for old growth should consider structural diversity, ground cover, soils, and other relevant factors. The Mehl criteria are inadequate**

The DEIS explained that the Forest does not have an inventory of old growth by the Mehl (1992) descriptions We still need to rely on our assessment of late-successional forests as an approximation of old growth until an inventory using the Mehl descriptions can be completed for the Forest We still feel that because of the large amount of late-successional forests on the RGNF, we are not putting old growth or species dependent on late-successional forests at risk We analyzed the risk to species dependent on late-successional forests in the DEIS (pages 3-113 to 132) We also revealed the abundance of late-successional forest relative to our Fragmentation and Connectivity discussion (DEIS pages 3-101 to 112)

However, we are revising the Draft Plan's Standard and Guidelines to reflect the concerns mentioned above We will strive to gather better old growth inventories over the life of the Plan and eventually refine the amount retained/recruited on the Forest We plan to produce better maps in the Final EIS which will show the distribution of late-successional forests

We explained the problems with an old-growth Management-area Prescription in the DEIS (page 3-137) and do not feel a prescription would be productive The quality issue of old growth is problematic Quality is heavily value-laden by humans We believe that "higher quality" old growth is a value judgement depending on the individual's perspective Some people view this as more or less structural elements (e g , down woody material) to favor a particular species of wildlife Others view it as large trees and high canopy coverage

without an inordinate concern for an age criterion Quality and biological significance are dependent upon the ecological characteristics that make a stand old for the site and for the tree species However, we will incorporate into the Final Plan's Standard and Guidelines some qualitative criteria based on Mehl's descriptions

The Regional Forester, in a 2410 letter dated September 28, 1992, declared the Mehl (1992) descriptions as the characteristics believed to represent old-growth conditions in the Rocky Mountain Region These are the descriptions we are using when we refer to "old growth "

1.3 **Forest Service management should set an example and have an influence on adjacent private land management.**

Although the Forest Service has no authority on private lands, we strive to demonstrate good stewardship of the land and thereby set a good example for others

1.4 **Do not allow livestock grazing or mining on the Forest.**

Livestock grazing and mines are valid, authorized multiple uses of the Forest

1 5 **I want more land protection than is provided in Alternative D. This Alternative does not sufficiently protect biodiversity. This Alternative advocates human use above those of other species.**

We believe that all the Alternatives provide sustainable ecosystems (see DEIS pages 2-17 and 18) Some Alternatives express a relatively stronger ecocentric perspective (i e , that humans are a part of the environment but are not central to all concerns) than others We felt that Alternative D expressed a relatively moderate anthropocentric perspective (i.e , interpreting everything's worth based upon human experience and values) We realize people have strong feelings on which perspective is the correct one We feel, from our analysis, that Alternative D will protect the biodiversity of the Forest

1.6 **What is being done to bring the nonforested communities back inside the Range of Natural Variability (Appendix A, page A-30)? Essentially all grassland communities are prevented from achieving late-successional status because of intensive livestock grazing In addition, process (e.g., fire) will need to be incorporated into grassland management**

The Standard and Guidelines for Range in the Draft Plan (Draft Plan page III-8) should improve ecological status of rangeland communities over time We recognize the need for getting fire back into these ecosystems There is an effort currently underway which is addressing prescribed natural fire and management ignited fire in fire-adapted ecosystems on the Forest

1 7 **Biological diversity has always been an issue, not just a new issue since 1985.**

We were just saying that since 1985, the issue of biological diversity has received much greater awareness and concern by the general public This is why it became a revision topic

1.8 **I disagree with statements made about the concept of island biogeography as the best way to perpetuate biodiversity (DEIS Summary page 9, Alternative F)**

A citizen's group developed this alternative, which the Forest Service adopted as our own It was the citizens' opinion that applying the concepts of island biogeography was the best way to perpetuate biodiversity

1.9 **I would like to see a Forest-wide flora and fauna inventory of the Forest. I would like to see more accurate inventories of TES and Special Concern species with better habitat relationships developed. There is high biological risk by moving forward with a Plan without adequate inventories. You need to adjust decision making to reflect the habitat protection requirements of all species identified in these studies.**

We are revising the Monitoring section of the Draft Plan We have identified needs for additional inventories and the need for better habitat relationships In any decision making process, one has to use the best available information at the time and proceed forward The Monitoring section of the Plan provides a feedback mechanism so we can continually review the effectiveness of management actions

1.10 There is no mention that there is much more known about the flora than about the rest of the biota (monerans, protists, fungi, animals) on the Forest

The DEIS mentions that very little information is known about fungi, bacteria, and other microorganisms (DEIS page 3-135) The Forest recognizes the need to have better flora and fauna inventories However, we will probably conduct limited studies on the Forest's microorganisms in the short-term

1.11 The Forest will be harmed without timber harvest Sharply reduced timber harvest will reduce the creation of new "edge effect" and reduce biodiversity.

The Alternatives attempt to provide a range of ideas about how best to manage the Forest The DEIS (pages 2-5 to 13) discusses how each Alternative reacts to the revision topics Each Alternative places a slightly different emphasis on how strong a role humans play in the management of the Forest We believe that each Alternative provides for sustainable ecosystems while providing some level of human influence

1.12 What is the impact of recreation on TES plants, Special Concern plants, and significant plant communities? What studies were cited?

The major focus of this section in the DEIS (Pages 3-80 to 100) was to demonstrate that the habitat for our special status plants and communities is not unique to one portion of the RGNF or even the Forest itself There is no information to indicate that these plants are restricted to specific conditions unique to the Forest (see Appendix E, pages EA to E10) This is an important point Then we looked to see if there was any recreational activity that appeared to impact the entire habitat of a particular plant species in a consistently negative way We could not demonstrate a consistently negative effect based upon proposed Management-area Prescription allocations and known special status plant or community occurrences on the Forest

In April 1994, the Forest undertook an extensive interview process to gain local and regional knowledge from people familiar with the Tri-section and the Forest's flora (see DEIS page 3-36) The reports from these interviews were submitted to the Colorado Natural Heritage Program (CNHP) so that they could update their Biological and Conservation Database The CNHP submitted a comprehensive report on the status of all known occurrences of threatened, endangered, sensitive, special concern plants, and significant plant communities on the Forest to us in October 1994 (DEIS page 3-84) This report provided known information for each special status plant or community's habitat, global, state, and county distribution data, a vegetation zone, and known management threats This report, the proposed Management-area Prescription allocations by alternative, and professional opinion helped form the basis for our conclusions

1.13 You need to have a better understanding of why your rare species are rare in the first place. What specific conservation measures are required for their restoration and recovery? There is little doubt that the present degree of imperilment of all species (G1, G2, G3, Sensitive, C-1, C-2, and listed species) is due to cumulative impact of past human development activities Is the habitat at optimal, sub-optimal, or marginal levels?

We have identified a need for better flora and fauna surveys on the Forest Please keep in mind that some of the rareness of species is more a function of low search effort or the cryptic nature of some species The DEIS evaluates both special status plants and animals The intent of this evaluation is to judge the risk to species posed by the management actions in each Alternative Since all the Alternatives minimally alter habitats, the majority of the RGNF landscapes proceed to change through natural processes Thus, special status

animals, plants, and communities should be able to perpetuate themselves under any Alternative The risk to species viability is considered small Deciding on whether habitat is optimal, sub-optimal, or marginal would depend on your definition and the specific species in question

1.14 Alternative F provides for biodiversity and restoration better than Alternative D.

The intention of each Alternative was to provide for sustainable ecosystems See DEIS pages 2-17 to 18 for a quick summary of the key attributes used to make this determination Each Alternative places a slightly different emphasis on how strong a role humans play in the management of the Forest We believe that each Alternative provides *for sustainable ecosystems while providing some level of human influence*

1.15 The aquatic resource and species protection discussion is not convincing in the DEIS.

We believe that they are complete We used current, available analysis information for our discussions

1.16 I would like to see less intensive use of the Cochetopa Hills area.

We are reanalyzing this area for the Final EIS and Plan

1.17 The value of biodiversity is not a human construct. It is a biological, chemical, and physical reality.

We agree that biodiversity is valuable for its own sake We did make this point in the DEIS on page 1-5 However, individuals do place value judgements on the "worth" of various components of biodiversity

1.18 The DEIS states, "The majority of the acreage is in Structure Class 5" and then presents a table with a figure of 40% (i.e., <50%) in Class 5 (DEIS page 3-49 -- Aspen on Mountain Slopes). This strikes me as a consistent effort on the part of the DEIS to convince the reader that plenty of "old growth" exists on the RGNF.

The table referenced was a Structure Class breakdown for the Aspen on Mountain Slopes Landtype Association The majority of the acreage is in Structure Class 5 relative to the other Structure Classes (DEIS page 3-49) There was no effort to distort the amount of old growth on the Forest We do believe that the Forest has a significant amount of late-*successional forest*

1.19 Astragalus ripleyi should not be discounted. Its center of distribution is the Conejos region. Ipomopsis multiflora should be a sensitive species for Region 2 -- the Colorado Natural Heritage Program ranks it G4?S1. There are compelling reasons to protect species that are at the edge of their range

We don't believe that we have discounted Astragalus ripleyi We were just trying to make the point that not all the occurrences of this plant were on the RGNF (DEIS pages 3-85 to 86)

The Regional Forester identifies Sensitive species and uses criteria found in Regional Supplement 2600-94-2 (Forest Service Manual 2670) The Forest does not make this determination The DEIS does evaluate the potential impacts on Ipomopsis multiflora, by Alternative, and found no reason to indicate consistent conflicts (DEIS pages 3-80 to 100)

1.20 Because a plant is not a preferred forage species, does not mean that it is not threatened by livestock, i.e., trampling, soil compaction, etc. (DEIS page 3-87).

The DEIS carefully outlined the risks to each Sensitive and Special Concern plant from range management activities. Trampling and soil compaction were identified (DEIS page 3-92) It is also important to realize that there are mitigation measures identified on DEIS page 3-88.

1.21 Table 3-22 is voodoo based only on known populations. Such an analysis is virtually irrelevant (DEIS page 3-89).

We disagree Using the knowledge of where existing plant populations occur relative to the Management Emphasis Categories, by Alternative, is relevant The purpose of this was to see if we were putting known special status plant populations consistently in one type of management allocation If we were, this would prompt us to look more closely at the allocation and see if there was a conflict

1.22 The DEIS page 3-97 states that adverse impacts to rare plants from livestock grazing can be reduced, "if the range is properly grazed " What does this mean exactly, and where is the assurance that proper grazing will occur? A great deal hinges on "proper grazing" practices, but there are few, if any specifics. How often will livestock be moved, what protection will be given to riparian areas, what will stocking levels be, and what will the criteria be? (DEIS page 3-92).

Resource protection measures are mentioned in the DEIS page 3-88 Proper grazing essentially comes down to vegetation utilization and residue guidelines (see Draft Plan relative to Riparian page III-5, and Range page III-8) Proper utilization of forage should not lead to a detrimental, focused use by livestock on any special status plants (DEIS page 3-92 to 98) A site-specific Biological Evaluation process makes project specific determinations on whether an activity adversely impacts Sensitive plants Specific stocking levels are done through range carrying capacity analysis and they take into consideration special status plants The assurance that proper grazing occurs is through monitoring (see Monitoring section of Draft Plan Chapter V)

1.23 The abstract on DEIS page 3-133 does not match the numbers in Table 3-36 (DEIS page 3-139) Table 3-36 does not match Figure 3-26 (DEIS page 3-110).

We will correct this

1.24 Using per-acre averages, over a project area, for snags and downed logs in the Biodiversity Standards section of the Draft Plan is a dubious approach. The potential for abuse is obvious (Draft Plan page III-6).

This is a genuine attempt to keep a minimum level of snags and downed logs in each project area This section of the Draft Plan is being revised.

1.25 Table A-2 (Appendix page A-5) demonstrates that spruce/fir forests are not dominated by old stands (81% are less than 215 years old).

More than 36% of the stands are more than 186 years old, so it depends on how one interprets the table However, stand age, as calculated in our database, is a stand average Thus, one needs to be careful interpreting these average ages since lots of young trees or lots of old trees skew averages The purpose of this table was to give a very general sense of age on the Forest Also, old is a relative term We really need to discuss old in the context of the species and the site potential This is research that needs to be done in the Rocky Mountain Region

1.26 Appendix A, page A-6 shows both mature and old growth with very low d.b.h. figures for a size criterion.

The size criterion is correct and has been used in this Region's Rocky Mountain Resource Information System (RMRIS) database for years

1.27 The Synthesis and Implications section (Appendix A, page A-48) waffles and vacillates about how the conclusions might affect management decisions.

The team was conservative in extrapolating qualitative data

1.28 Emphasis on TES species and Species of Special Concern begs the question of the overall effect of management on the ecological integrity of the RGNF as a whole

The DEIS on page 3-22 outlined an approach to evaluate management of the Forest's biodiversity which included a Fine-filter assessment, a Coarse-filter assessment, and a Range of Natural Variability assessment Collectively, these form the biodiversity assessment for the Forest which looks at the "whole" (DEIS pages 3-22 to 141)

1.29 There is a tendency to equate suitable habitats with viable populations of both plants and animals. One example is Eriophorum altaicum var. neogaeum There is an assumption that since the habitat is abundant, the species is secure.

Each species is evaluated on its own merits In the case of Eriophorum altaicum var neogaeum, the potential habitat is abundant and the threats appear to be low Therefore, at the Forest Plan programmatic level, it seems reasonable to judge this plant at low risk Keep in mind that a site-specific Biological Evaluation must be completed before any project is implemented

1.30 You need more data in order to make reasoned decisions

We will never have all the possible data we need to answer every question we have We have made a sincere attempt to take the best information we have reasonably available and conduct the best analysis we could with the time available The Forest Plan is a dynamic document, meaning it can be amended at any time as new information warrants a change

1.31 You should only use timber harvest as a tool to protect biodiversity.

The theme of Alternative A was to use timber harvest as a by-product of meeting some other resource needs; for example, wildlife habitat improvement The other Alternatives utilize timber harvest to varying degrees These Alternatives recognize the social desire to have some level of sustainable timber harvest to meet resource objectives and provide local economic vitality

1.32 Old growth aspen stands should not be the top target for regeneration stands. These old growth stands of aspen have wildlife values that should be provided, and not routinely cut for regeneration goals (Draft Plan page III-7).

The Draft Plan page III-7 lists criteria for prioritizing aspen regeneration The Guidelines were intended to focus work on aspen stands that were in the greatest risk of disappearing There is no mention of focusing aspen treatment on old growth

1 33 Any treatments that are planned with the spatial analysis model should mimic natural conditions as much as possible (RE· Erhard et al. (1995)).

That is our intent of how the model should be used

1.34 Special management emphasis is required for all sensitive, threatened, and endangered (TES) species. The Forest Service must first determine the status, distribution, and threats to all TES species on the Forest. It has failed to do so.

The DEIS pages 3-80 to 100 (plants) and 3-113 to 132 (animals) addresses your concerns in detail

1.35 Many "unavoidable adverse effects" can be decreased or avoided by decreasing motorized vehicle use, livestock grazing, timber harvest, and mining operations to levels which would allow the Forest ecosystems to remain within the Range of Natural Variability (DEIS page 3-388).

The uses mentioned are valid, authorized multiple uses on the Forest The Draft Plan lists Standard and Guidelines with a purpose to prevent degradation of the environment There are some activities that are socially desirable to remain outside the Range of Natural Variability (e g , fire suppression to protect life and property)

1 36 **Another issue needing attention is the direct use of exotic species as part of routine management (e.g., seeding clearcuts with grasses) and the invasion of exotic species into managed vegetation. Seeding should be done with native species.**

See Draft Plan page III-6, Biodiversity Standard 2

1.37 **The Management Emphasis Categories are set up in a way that fails to address the impact of recreation on plants Category four is grouped with Categories 1-3, which according to the Draft EIS, does not sustain most of the potential alteration (DEIS pages 88 and 89).**

The Management Emphasis Categories provide a general estimation for potential vegetation manipulation and ground disturbance Generally, most of the potential habitat alteration occurs in Categories five through eight We stated in the DEIS (page 3-89) that, " livestock grazing and recreation impacts are not adequately accounted for in this scheme and are addressed separately in their respective effects sections below " Recreation impacts on special status plants are specifically addressed in the DEIS on page 3-98

1.38 **What is the impact of trampling by livestock on special status plants (DEIS pages 3-92 to 93)? What studies have been done to determine the effects of grazing on these plants (DEIS pages 3-93 to 97)? What is the impact of livestock grazing on water quality for these plants (DEIS page 3-97)?**

The DEIS page 3-92 mentions that livestock can impact special status plants by trampling The DEIS further evaluates each special status plant's susceptibility to livestock grazing Plants strongly associated with rocky habitats and plants associated with closed-canopy forest land were excluded from this analysis The assumption was that these habitats have low susceptibility to livestock impacts The remaining plants were discussed in the DEIS on pages 3-93 thru 97 Relevant literature, as cited in the DEIS, was used to help in our evaluation A determination was made that proper grazing would not lead to a detrimental impact on these plants Therefore, we would infer that there would be no detrimental impact on water quality

1.39 **There is no explanation for how the Landtype Associations were determined. For example, there is no "Bristlecone Pine on Mountain Slopes" Landtype Association. This is a major forest type on the Forest, not merely an inclusion as implied in the DEIS page 3-51 The Forest should redo the Landtype Association classification by using quantitative analysis.**

The explanation for how Landtype Associations were developed is clearly explained in the DEIS page 3-41 Bristlecone pine occurs as very scattered stands throughout the Forest At the Landtype Association scale (ECOMAP 1993), we felt that it was more appropriate to treat bristlecone pine as an inclusion rather than a separate, mappable ecologic unit

1.40 **I disagree with the statement that none of the Significant Plant Communities listed in Table 3-21 (DEIS page 3-87) are uncommon on the RGNF. Four of these plant communities (one, two, three and five) were once common on the Forest, but now exist in most of their former area only in a degraded state, due to overgrazing by domestic livestock. The other two communities (four and six) have always been rarer on the Forest, since they occur in more restricted environments. Environmental consequences need to be addressed for these Significant Plant Communities. I disagree with the DEIS statement that proper grazing within these communities should not lead to detrimental impacts**

We disagree with your rarity statements The relative rarity of each Significant Plant Community was discussed in detail in Appendix E page E-10 to 11 Based on Global rankings (Appendix E page E-3), the rarest plant community is number four (Pinus edulis - Juniperus monosperma / Stipa scribneri) This plant community is common along the foothill's portion of the Sangre de Cristo Mountains Therefore, it is relatively common on the RGNF There is very little livestock grazing remaining in the RGNF's portion of the

Sangre de Cristo Mountains, so we don't feel that grazing is a threat to this community overall

Plant community number six (Pseudotsuga menziesii / Juniperus communis) is a G5 ranked community (globally very common) It is very common on the RGNF

There is no question that many plant communities on the RGNF exist in a degraded condition due to past livestock grazing (see Appendix A, pages A-25 to 31) The key to properly managing all accessible plant communities, including the Significant Plant Communities, for domestic livestock use is to comply with the Standards and Guidelines listed in the Draft Plan for Range (page III-8) and to monitor compliance (see Draft Plan Chapter V) *We feel this applies to all grazable communities, including the Significant* Plant Communities

Environmental consequences for Significant Plant Communities were discussed in the DEIS pages 3-88 to 100

1.41 I am enclosing literature and the names of people that I believe are pertinent to your review process

Thank you for the information The interdisciplinary team will review your suggestions

1.42 Your discussion of ecosystem management and biodiversity are inadequate. The Forest has failed to recognize the necessity of managing for native diversity.

We disagree We discussed the Forest Service's management philosophy change to ecosystem management and what that means to the Forest Service (DEIS pages 1-4 to 6) We spent considerable effort discussing biodiversity as a revision topic We discussed how each Alternative responded to biodiversity (DEIS pages 2-4 to 13) We devoted a significant portion of Chapter Three in the DEIS to Principles of Biological Diversity, the Hierarchy of Ecological Units, and finally a Biodiversity Assessment at multiple spatial scales (DEIS pages 3-5 to 141)

1.43 I do not believe you have provided for the long-term sustainability of all native plants.

We disagree The whole purpose of the biodiversity assessment was to evaluate the impact of the Alternatives on the Forest's resources -- including plants We started our *assessment at a very large geographic scale (Province -- an area roughly from Montana to* New Mexico along the spine of the Rocky Mountains) and continued our analysis down through a spatial hierarchy to the Forest level The purpose of this was to better understand the role the RGNF plays in larger ecologic units We were specifically trying to uncover whether there were any activities that could lead to a species decline by Alternative Please see DEIS pages 3-22 to 141

1.44 More specific standards and procedures are needed for the definition and selection of sensitive species on the RGNF

The Regional Forester identifies Sensitive species and uses criteria found in Regional Supplement 2600-94-2 (Forest Service Manual 2670) The Forest does not make this determination

1.45 The RGNF has failed to map either the habitat components of all of its TES species or complete the mapping of all unique botanical communities. This must be a major, priority undertaking. There is nothing in the DEIS or Draft Plan that ensures rare or unique communities will be identified and preserved. Conservation of the full range of ecosystems is appropriate not only in its own right, but also for its contribution to landscape, species, and genetic diversity. The Plan must explain in detail how it intends to monitor changes in TES species habitat and communities of species over time.

We are revising the Monitoring section of the Draft Plan and we have identified this as a resource inventory need The monitoring will also address evaluating changes in TES habitats and significant plant communities over time

Keep in mind that we used the most current information available in our analysis In April 1994, the Forest conducted an extensive interview process to glean knowledge from individuals about the Forest's rare plant and animal resources This information was used to update the Colorado Natural Heritage Program's (CNHP) Biological and Conservation Database The CNHP ultimately submitted a detailed report to the Forest (October 1994), which was incorporated into the rare plant and animal sections of the DEIS and Draft Plan

The DEIS addresses TES species in detail (plants -- see DEIS pages 3-80 to 100, animals -- see DEIS pages 3-113 to 132)

The Forest has also proposed numerous Research Natural Areas which represent ecosystems from the Foothills Zone to the Alpine Zone in both the Sangre de Cristo Mountains and the San Juan Mountains

1.46 **We suggest the following goal language, "Provide habitat capability needed to ensure at least the long-term population viability of all native plant and animal species. For species and biological communities with special commercial, recreational, scientific, subsistence, or aesthetic values, determine desired levels consistent with maintenance of overall diversity, and provide the necessary habitat capability to achieve those levels "**

We think the Forestwide Desired Condition statements for Biological Diversity and for Threatened, Endangered, and Sensitive Species (Draft Plan page I-1) cover your concern

1.47 **The DEIS fails to make a clear distinction between functional old growth as it relates to habitat requirements of native wildlife species, late-successional forest, and old growth in the commercial logging sense. The definition of late-successional forest (DEIS page 3-44) must be refined and explained in greater detail.**

The DEIS page 3-121 discusses the tie between Sensitive wildlife species and Structure Class There was no instance where a species was specifically and exclusively tied to old growth, as defined by the Mehl (1992) descriptions However, there are species that are associated with late-successional forests (Structure Class 5) We think the definition was clearly portrayed in the DEIS page 3-44

1.48 **There is no Alternative proposed which considers biodiversity preservation and natural ecosystem functioning as the principal management emphasis throughout the Forest.**

The intention of each Alternative was to provide for sustainable ecosystems See DEIS pages 2-17 to 18 for a quick summary of the key attributes used to make this determination Each Alternative places a slightly different emphasis on how strong a role humans play in the management of the Forest We believe that each Alternative provides for sustainable ecosystems while providing some level of human influence Alternative A expresses a relatively strong ecocentric perspective (i e , that humans are a part of the environment but are not central to all concerns) toward the environment (see DEIS page 2-5)

1.49 **The Forest should follow, "Forest Ecosystem Management: An Ecological, Economic, and Social Assessment." This document describes a three-phase process for ecosystem management planning in detail, which includes the following: 1) development of a network of conservation reserves and a prescription for compatible management of the intervening lands, 2) reinstituted forest planning with emphasis on assurance against losses of biological diversity and ecosystem processes, and 3) implementation, monitoring, and adaptive management**

All the Alternatives follow the spirit of the process you mention Although only Alternative F specifically identifies a formal conservation reserve system, the other

Alternatives have a mix of Management-area Prescriptions which effectively function as a conservation reserve system The other Alternatives propose a management scheme to manage the "matrix" (manage for natural landscape diversity) This approach essentially zones the Forest with Management Emphasis Categories Conservation reserves and connective corridors are present without being labeled as such The DEIS page 3-138 shows the amount of land allocated to Management Emphasis Categories one through four We believe these categories allow natural processes to dominate these landscapes

We also believe the focus in a Coarse-filter approach to conserving biodiversity should be on the landscape matrix rather than on a conservation reserve system

Implementation, monitoring, and adaptive management are addressed in the Monitoring section of the Draft Plan (Draft Plan Chapter V) which will be revised for the Final

1.50 **The DEIS fails to conduct landscape level planning that addresses fundamental issues such as size, structure, dynamics, spatial arrangement, functional integrity, and connectivity of habitat patches up to regional ecosystem scale. When does the RGNF, in concert with other forests in the Region, intend to conduct this type of analysis and planning for the entire San Juan Ecosystem? The DEIS and Draft Plan must provide more meaningful consideration of the size, spatial arrangement, and integrity of current habitat patches (existing conditions). There must be greater attention to ground-truthed corridors and other means of fragment interconnection.**

The Forest has conducted a multi scale assessment and has considered the components of diversity, i e , composition, structure, and function (process) We conducted an assessment of ecological units from the Forest level (using Landtype Associations), Tri-section (which covers the greater San Juan ecosystem), and finally the Province level (essentially the central Rocky Mountains) Please see DEIS pages 3-22 to 79

The Fragmentation and Connectivity section (DEIS pages 3-101 to 112) discusses patch isolation, patch size, edge effects, and corridors in detail

1.51 **The DEIS and Draft Plan fail to take cognizance of and plan for the off-forest impacts of its own actions.**

We disagree The DEIS specifically addresses cumulative effects throughout Chapter Three

1.52 **The RGNF must implement methods for restoring and recreating diversity Because of the extent of habitat destruction, which has not been fully disclosed in the DEIS and Draft Plan, and fragmentation, simple maintenance of the status quo will, in many cases, condemn the RGNF to an unacceptable impoverishment of life forms and natural processes in the near future.**

We disagree with your assessment of the RGNF We have established a process to identify watersheds of concern (DEIS pages 3-210 to 235) and we are either restoring these watersheds or they will be scheduled for restoration We disagree with your statement that "destruction" on the RGNF has not been fully disclosed or that we are maintaining the status quo Please review Chapters One and Two of the DEIS which discuss the need to change and provide a review of Alternatives.

1.53 **We are aware of no issues that would compel the RGNF to manage for "natural landscape diversity."**

The basis for this statement comes from an interpretation of what Ecosystem Management means in the Forest Service and how to consider biodiversity in the Plan revision The DEIS page 1-5 discusses this shift in management philosophy The philosophy tries to meld the concepts of 1) sustainable ecosystems, 2) sustainable economies, and 3) sustainable social needs We view a goal of trying to perpetuate natural landscape diversity as a means for providing sustainable ecosystems We do not want to create a landscape condition which rarely existed in the past Our assumption is if we manage most ecosystems within their evolved composition, structure, and process, then most, if not all, species should be able to perpetuate themselves We know we cannot do this on every landscape and at every

scale, but we want to be cognizant of all our activities and their cumulative effect See the Biological Diversity discussion for each Alternative in Chapter Two of the DEIS to see how we applied these concepts

1.54 **The use of natural variability should not be used as an attempt to turn managed landscapes into any single preexisting condition, if for no other reason than selecting conditions at any particular date as the reference may be biologically arbitrary.**

We agree that mimicking any one point in time is arbitrary The Range of Natural Variability assessment (Appendix A) was intended to provide a historical perspective of the Forest's ecosystems, how they evolved, to best of our knowledge, and how people used the resources Pre-settlement conditions give us some clues of natural evolution of the Forest's ecosystems We know we cannot uniformly recreate those conditions However, trying to get a better understanding of those conditions is valuable Understanding how humans have accelerated changes to the environment is important Collectively, these two ideas help us better assess our biodiversity and help us make better choices in our management

1.55 **On the one hand the draft document contains statements such as, "The Forest is probably seeing a landscape nearing a peak of late-successional forest," (DEIS page 3-139); and "As the acres of older forests increases, there could be an increased incidence of high-intensity fires or insect and disease epidemics," (DEIS page 139); and "Great potential exists throughout most Forest cover types, for large-scale infestations or disease," (DEIS page 3-191). On the other hand, the documents do not address the apparent risks of adopting a system [spatial analysis -- paper by Erhard et al. (1995)] that governs intensively managed landscapes by making them similar to the average land coverage proportions found in roadless areas and wilderness areas; neither does the Forest project the effects on growth and yield nor forest health on managing for "natural landscape diversity "**

Some of the quotations were not precisely reiterated and omit some key points The actual statements from the DEIS page 3-139 were as follows

> The majority of the RGNF's forested acreage is late-successional forest In the future, as the acres of older forests increase, there could be an increased incidence of high-intensity fires or insect and disease epidemics
>
> Since the spruce LTA forms the vast majority of the late-successional forests (581,361 acres), the probability of catastrophic disturbance increases every decade From a social perspective, large-scale disturbances may be unacceptable However, plants and animals] evolved under large-scale disturbances The danger to species and ecosystem function may lie in not allowing some degree of large-scale disturbance to occur in the future
>
> There is insufficient information on Range of Natural Variability for the older-forest component of LTAs At least in the spruce LTAs, the Forest is probably seeing a landscape nearing the peak of late-successional forest

Some of the key language about the need for disturbance on the Forest was omitted in the comment's quotations

It is important to point out that the spatial analysis work by Erhard et al applies only to the Engelmann Spruce on Mountain Slopes Landtype Association (LTA1) The work of Erhard et al used roadless areas and some Wilderness areas within LTA1 to form a baseline of information Since the reference areas have been minimally altered by humans, they appear to be the best reference to help us mimic natural composition, structure, and process We suggest that the risk of perpetuating the Forest's natural diversity may be higher if we do not conduct spatial analysis Manipulating forest stands in terms of composition (species mix) and structure (within stand vertical diversity and pattern across the landscape) may be very risky if done for the single purpose of minimizing fire, insect, or disease outbreaks

The spatial analysis work was not modeled in FORPLAN because it was not a constraint relative to other Standard and Guidelines

1.56 The description of Alternative NA is very negative (DEIS page 2-4) The implication that Alternative NA would not "ensure long-term sustainability (i.e., maintaining site productivity, biological diversity, and natural process) of the Forest" is not defensible

We do need to review the language since we said that all Alternatives provide for sustainable ecosystems A key change here is that Alternative NA is evaluated with the new, proposed Standard and Guidelines and we did not make that clear in the DEIS page 2-4 *Otherwise, under the old 1985 Standard and Guidelines, this Alternative is the* fundamental reason for the revision This is why we spent considerable effort evaluating biodiversity in the DEIS (pages 3-5 to 141) Most of the Standard and Guidelines in the Draft Plan either directly or indirectly protect the Forest's biodiversity

1.57 Doesn't "keeping large areas undeveloped" promote more late-seral stage forests, thus reducing diversity?

Yes, it would promote more late-successional forests The question of diversity is not as clear A discussion of diversity begs what kind of diversity (i e , genes, species, ecosystems, or landscapes)? But, more fundamentally, we make assumptions that we can manage landscapes and maintain the native species diversity (and other types of diversity) inherent to those areas If we are wrong, we would be poor land stewards to not have undeveloped landscapes that allow natural processes to predominate The hard question is how much undeveloped landscapes do we set aside? Just a discussion of species diversity is complicated There is enormous "invisible" diversity (e g , fungi and bacteria) that we know very little about -- yet is undoubtedly critical to ecosystem function We have to be conservative in our land allocations that manipulate habitat and yet balance human needs We think the Alternatives accomplish this

1.58 With the late-successional forest at its historic peak, and in some cases outside the Range of Natural Variability, isn't it a mistake to "maintain an abundance of late-successional forest?"

The Alternatives do propose cutting late-successional forest However, it is important to point out that the theme of the Alternative and the Management-area Prescription allocation have a bearing on the amount of land that can be treated Standards and *Guidelines also play an important role in determining the extent of harvest activities The* result is that we will maintain a large amount of late-successional forest on the RGNF

1.59 What will be the measure of perpetuating biological diversity (Draft Plan page I-3 for Roadless areas)?

See the Monitoring and Evaluation Strategy section of the Draft Plan (Chapter V) under biodiversity This section will be revised for the Final EIS and Plan

1.60 What does, "Ecological conditions will be maintained, while emphasizing selected biological structures and compositions considering the Range of Natural Variability," mean, and how will it be implemented? The second paragraph appears to be out of context in this document (Draft Plan page IV-33).

Management Emphasis Category 5 describes a group of Management-area Prescriptions where intensive management is allowed for restoration or for manipulating habitat Because of this, vertical stand structure or landscape pattern (biological structures) and selected species (compositions) may be affected The Range of Natural Variability will be used as reference to help frame decisions but not necessarily dictate decisions The second paragraph talks about the types of treatments to expect and elaborates on the role the Range of Natural Variability plays in decision making

1.61 It appears that there needs to be an expansion of, not a reduction, in both the use of *fire and silvicultural tools to keep the forest within the Range of Natural Variability* and provide for biological diversity.

The Alternatives do propose using timber harvest and Management Ignited Fire However, it is important to point out that the theme of the Alternative and the Management-area Prescription allocation have a bearing on the amount of land that can be treated Standards and Guidelines also play an important role in determining the extent of these activities We recognize the need for getting fire back into these ecosystems We also value the role that timber harvesting can play toward meeting our desired conditions

1.62 **No definition of old-growth prescription is given in the planning documents It is difficult to know how the volumes contributing to ASQ in these documents were calculated when no defined prescription exists for old-growth forests and that it is clearly stated it will be decided at the project level.**

FORPLAN estimates the amount of timber that is available, but the Forest team at the project level determines 1) retention, 2) recruitment, and 3) harvest selection of late-successional forest using Standards and Guidelines We did not create an old-growth land allocation because we felt there was insufficient information to do so (DEIS page 3-137) The Draft Plan (page III-6 to 7) lists Standards and Guidelines which were intended to help teams consider old growth in their project activities This section of the Draft Plan will be revised for the Final

1.63 **It seems odd that Scenic Byways and Scenic Railroads are not managed for old growth. In this Plan, timber harvest is encouraged on these Management-area Prescriptions.**

It's true that this land allocation (4 21) is in the suitable timber base This was done to allow flexibility in managing high-quality scenery Thus, a variety of tools, including timber harvest, are available to meet desired conditions

1.64 **Old growth is not mentioned in the DEIS appendices other than in the glossary.**

There was no reference in the DEIS to an old growth section in the Appendices

1.65 **There is no evidence presented in this analysis that indicates the RGNF needs 710,509 acres of old growth to meet its habitat requirements. A much wider range of Alternatives must be considered The upper limit of old growth thought to exist in pre-settlement times seems to have a tremendous influence on all the Alternatives presented Certainly there were times during pre-settlement when far less old growth existed than exists now. The analysis fails to present a rationale as to why all Alternatives should manage at this high-end level of old growth acres**

The 710,509 acres are late-successional forest, which we believe includes old growth (per Mehl (1992) descriptions) Please review the Alternative themes presented in Chapter Two of the DEIS We believe the Alternatives are responsive to the issues and present a fair range

1.66 **There is not much attention paid to disturbance-based species Where disturbance regimes are mentioned (DEIS page 2-18), the measurement is that of T&E species and old growth.**

We are not clear on what you mean by disturbance-based species To some people this might refer to species that thrive under mid-seral and lower ecological status. If you agree with this interpretation, then we disagree with your statement We spent considerable effort describing how much the RGNF's landscapes have been altered (and unaltered) throughout the DEIS We also explain, by Alternative and by resource area, what the projected alteration from activities will be over the next ten-year planning period

We sense that you may have misunderstood our intentions on DEIS pages 2-17 to 18 This section was summarizing how the Alternatives addressed biological diversity as a revision topic One of the components of sustainability was, "Natural ecosystem processes are maintained " Our conclusion that the Alternatives was sustainable for natural ecosystem process referenced the following sections of the DEIS. 1) Threatened and Endangered

plants, Sensitive Plants, Special Concern Plants, and Significant Plant Communities, 2) Threatened, Endangered, and Sensitive Animals/Viability, 3) Fragmentation and Connectivity, 4) Old growth, 5) Forest Insects and Disease, and 6) Fire and Fuels Management. This is more than your statement implies about TES species and old growth

1.67 **If this Forest is managing the Forest for the visual resources it should consider its statement in the DEIS page 3-26 that notes that the real old-growth stand of ponderosa pine is more often an open forest, not the dense, multi-layered forest people think of for old growth. It is admirable the RGNF recognizes that people want the Forest to look a certain way, but what they want it to look like may not match up with the old growth emphasis the Forest is placing on its management in all these Alternatives.**

The DEIS page 3-26 was describing conditions generally throughout the Province The statements about ponderosa pine are true. The RGNF has relatively few acres of ponderosa pine and a relatively large amount of spruce/fir The vast majority of late-successional forests on the RGNF are spruce/fir The comments for ponderosa pine do not apply to spruce/fir. We are concerned about the ecology of the ponderosa pine type on the RGNF and it is an area of focus for the Management Ignited Fire program to bring fire back into these fire-adapted ecosystems

1.68 **There is recognition in the DEIS (page 3-138) that management of an old-growth stand can involve harvest and still have an old-growth stand remaining. It is not recognized in the DEIS that there may have been long periods of time in pre-settlement times that no old growth was present. The Forest Service can choose to manage this Forest by natural forces or by human management activities.**

The statement in the DEIS page 3-138 said that an individual-tree selection harvest could leave a stand relatively intact We do not support a general statement that all late-successional forests could be harvested and also maintain all old-growth values There are fundamental differences between natural processes and timber harvest The obvious ones for timber harvest are a road network and removing boles from the site No one will precisely know the true old growth Range of Natural Variability However, we are using the best information we have available We do not think it is wise to manage for no old growth

1.69 **It should be disclosed how much the Standard and Guidelines in the old growth section of the Draft Plan (pages III-6 and 7) is going to impact ASQ. This Draft Plan does not tell us what it is going to do with old growth It is not clear how the Desired Conditions and Guidelines for Management-area Prescriptions 5.11 and 5 13 will work in implementation (Draft Plan pages IV-34 to 36).**

The Standard and Guidelines for this section of the Draft Plan are being revised for the Final EIS and Plan The paper by Erhard et al (1995) provides direction for the spatial configuration of late-successional forests in the Engelmann Spruce on Mountain Slopes Landtype Association, where the majority of the projected timber harvest will occur We will revise the paper to make our intent clearer FORPLAN did not model the spatial analysis because it was deemed an insignificant constraint compared to other constraints in the model

1.70 **The statement, "There will be no loss of species " is made for every Alternative except NA. This implies that a loss of species may occur in this Alternative That is inconsistent with the statement that every Alternative is legal and implementable under current laws and regulations.**

We will correct the omission

1.71 **The theme for Alternative F states the natural disturbance regime is expected to reestablish itself where feasible. The meaning of this is not clear. How is this different from other Alternatives?**

Alternative F allocates the most land to settings where there is minimal human intervention. Thus, most of the land under this Alternative proceeds to change through natural processes

1.72 **The requirement that humans are allowed as long as they are compatible with protecting biological diversity is not definitive (theme for Alternative F, DEIS page 2-11).**

A theme is merely a framework for concepts and ideas about an Alternative In this case, Alternative F is selectively choosing a large degree of minimal human influence on the environment with a small degree of human intervention Whether this Alternative is the best choice for protecting biodiversity is not something we can easily quantify

1.73 **You should add loss of "true old growth" (ancient forest) to your list of irreversible and irretrievable commitments of resources (DEIS page 3-390).**

We disagree Late-successional forests are a renewable resource This is not to say that we take them for granted or diminish the significance of the time period it takes to create them The Biodiversity Standard and Guidelines value preserving older stands over younger stands (Draft Plan pages III-6 to 7) Forest stands that are remarkably old (old for the species and for the site) would be candidate for Special Interest Area or Research Natural Area designation

1.74 **Your exaggeration of ponderosa pine old growth is particularly disingenuous when one considers that the ponderosa pine/Douglas-fir Landtype Association (LTA) comprises only 6% of the Forest (DEIS page 3-55); the ponderosa pine cover type is only 2.1% (DEIS 3-77); and your definition of ponderosa pine old growth gives it only 30% of the whole ponderosa pine LTA in the Forest (DEIS 3-136) The figure is 10% on DEIS page 3-24. This is unclear.**

All the figures are accurate Remember that the LTAs express potential, but cover type expresses existing conditions (review DEIS pages 3-41 to 44 where this is explained) The last figure you mention (DEIS page 3-24) is the estimated percentage of older ponderosa pine cover type for the entire Province -- not just the RGNF

1.75 **Your discussion of old growth conspicuously omits describing its value for human spiritual needs (DEIS page 133).**

Our discussion focused on the ecological nature of old growth We recognize old growth has different meanings to different people For instance, some people value old growth for its structural attributes (e.g , down logs) -- particularly as they apply to wildlife habitats Others view old growth from a spiritual perspective Finally, others view old growth ecologically -- as an important advanced stage in ecological succession. All of these are important Our write-up did not stress the spiritual value of old growth due to the uniqueness of this feeling to different people We will mention this point in the Final EIS

1.76 **Biodiversity addresses health of the ecosystem. The human community and its economic health must be considered when addressing ecosystem management**

We believe we have addressed your concern Humans are an important part of biodiversity (DEIS page 3-5) The DEIS page 1-5 discusses the shift in management philosophy to ecosystem management The philosophy tries to meld the concepts of 1) sustainable ecosystems, 2) sustainable economies, and 3) sustainable social needs The DEIS spends considerable effort discussing the effect of Alternatives on the ecological resources of the Forest and then discusses the effect on the social condition -- both in the San Luis Valley and beyond (DEIS pages 3-364 to 385)

1.77 **It is important to understand that a mix of seral stages is vital to diversity (Draft Plan, Forestwide Desired Conditions, Biodiversity page I-1).**

We have stated this in the section you referenced

1.78 **You need to be sure that ecological resources are evaluated properly and that the desired conditions are obtainable (Draft Plan Chapter V).**

This is our intent We are revising the Monitoring section of the Draft Plan for the Final

1.79 **A reduction in AUM numbers would have the least effect on potential herbivory of sensitive plants, special concern plants, and significant plant communities as compared to range management practices that promote proper grazing of forage (DEIS page 3-98).**

We agree that the key to properly using the forage resources on the Forest is to promote proper livestock grazing Our statement said that if the livestock AUMs are lower on the Forest (as proposed in Alternatives A and F), then the potential herbivory by livestock grazing special status plants probably also goes down We think this is a logical interpretation

1.80 **I disagree with your statement that livestock have probably altered the species composition of nonforested communities (DEIS page 3-175). Appendix A, page A-23 says, "Observations do not detail general forest conditions or provide statistically reliable data that is now accepted by peer-reviewed scientific study." Also, see Appendix A, page A-48 where it says: 1) Information collected were not completed using scientific methods and 2) The bulk of this information was not reviewed by respected members of the scientific community at the time of documentation. I don't believe you have evidence to show that grazing on the landscape during pre-settlement wasn't as high as it was at the turn of the century.**

The Range of Natural Variability report (Appendix A) discusses several topics You have mixed statements from the nonforested communities with the forested communities discussion The forested communities portion of Appendix A had little detailed information on pre-settlement conditions What little information existed was from a narrow geographic area or perspective Thus, the page references you quoted were made in relation to forested communities and the lack of detailed, peer-reviewed pre-settlement data

However, the nonforested community discussion carefully traces the history of livestock numbers on the Forest There is documentation that livestock numbers began to decline on the Forest by 1929 due to documented overuse of the resource But, as you suggest, there is no precise documentation of pre-settlement grazing impact The inference we made was that domestic livestock were a dominant, new phenomenon on the RGNF post-settlement If the number and extent of introduced plant species are any indication (see Appendix A, pages A-28 to 30), then a strong inference can be made that nonforested communities have undergone species composition changes since settlement

1 81 **I disagree with the nonforested Range of Natural Variability conclusions. I don't believe riparian areas and upland communities have been significantly altered in their species composition. It must be noted that succession is in a continual pattern of change. Appendix A, page A-49, under Stream-channel Stability says, "no adequate data exists to say that any particular stream is within or not within the natural range of variability."**

The Range of Natural Variability report (Appendix A) discusses several topics You have mixed statements from the nonforested communities with the Stream-channel Stability discussion The Stream-channel Stability section is making conclusions about the stream channel itself The nonforested community's section is making conclusions about the vegetation

Plant species generally react in predictable outcomes to repeated livestock grazing As more palatable plants are reduced or eliminated from a community over time, there are other native plants that increase in prominence There are also introduced plants that increase under frequent, repeated grazing See Appendix A, pages A-28 to 30 for a detailed description of changes in each vegetation zone on the Forest

1.82 **I would like to see you add the statement, "However, there is no systematic inventory that documents the composition of condition of the Forest's nonforested lands" to the conclusions section listed in the DEIS page 3-175.**

Appendix A, page A-30 to 31 (Summary and Conclusions Nonforested Communities) says, "Early journals and records give an incomplete description of nonforested communities There are no records of a pre-settlement species composition or landscape pattern Even today, there are no comprehensive, detailed inventories of species composition and condition of nonforested communities Therefore, we can only make general inferences " Thus, we have made the statement in the conclusions portion of the Range of Natural Variability report However, the statement itself is not a conclusion, but a description of one piece of information we are lacking and leads us to make inferences We do not feel that this needs to be added to the page you reference

1.83 **Forestwide Objective 3.1 (Draft Plan page II-3) addresses the need to manage ecosystems at various scales. However it does not speak to ecosystems that occur at scales smaller than watersheds. Rewording this objective to provide for management of ecosystems at varying scales, to include regional, landscape, watershed, or smaller scales, as appropriate, would address this objective more comprehensively.**

We agree with your suggestion. We will make the change for the Final Plan.

1 84 **We are concerned about direct impacts (removal by ground disturbance) and destabilization of surrounding slopes for a population of Senecio dimorphophyllus var. intermedius on the Forest within a Forest Products prescription. We feel that direct protection and monitoring are needed for this population.**

There are several documented occurrences of this plant on the Forest, so it is unlikely each population will be affected in the next planning period Also, the population you mention has no road access and is very remote The chance of timber harvest affecting this population in the next planning period is extremely low It is important to recognize that just because a population is in a Forest Products Management-area Prescription (5 13) does not mean that the entire area will be harvested in the next planning period We are revising the Monitoring section of the Draft Plan to better track changes in habitat forest-wide that might affect our known special concern plant populations

1.85 **The Pinus aristata/Festuca arizonica plant community would be threatened by any actions that would significantly alter the understory, such as weed invasion or grazing Because the community near Creede falls within the Scenic Byways or Railroads prescription, we recommend that this area be monitored and protected from significant impacts.**

This particular site is inaccessible to domestic livestock due to very steep slopes This site should not experience any alteration over the next planning period We are revising the Monitoring section of the Draft Plan for the Final Plan We plan to develop a monitoring scheme that more comprehensively addresses the Colorado Natural Heritage Program occurrence elements

1 86 **The preponderance of recreation uses and the dispersed nature of potential impacts in Alternative E demand monitoring efforts that may not currently be possible with existing funding. It is also unclear that site-specific protection and management needs for Colorado Natural Heritage Program identified sites are met through this alternative**

We are revising the Monitoring section of the Draft Plan for the Final Plan We plan to develop a monitoring scheme that more comprehensively addresses the Colorado Natural Heritage Program occurrence elements

1 87 **We would like to suggest that the Forest add the following topics to those listed under "Research and Information Needs Assessment" (Draft Plan page V-4):**

1) Field verification of old or imprecise records of rare/imperiled species and significant natural communities.
2) Field assessment of element occurrence quality and threats.
3) Field assessment of impacts on element occurrences from management activities.
4) De novo inventory for RTES species and significant natural communities.

We are revising the Monitoring section of the Draft Plan for the Final Plan We will add the components you suggested

1.88 ***The Forest Service needs to show how they determined that most of the Forest is in any structural condition.***

The term we used was Structure Class and it is defined in the DEIS on pages 3-43 to 44

1.89 **Appendix A, pages A-28 to 31 mentions "increasers" but does not mention decreaser species. Why is there no discussion of the native plants which tend to be decreasers? These are the plants that tend to be adversely affected by livestock grazing.**

We focused the discussion on the increaser and invader plant species to make the point that these species indicate important shifts in the Forest's biodiversity For the sake of brevity, we didn't feel we needed to talk about the decreaser species to make the point we were making

1.90 **There is no ecological condition for LTA10 [Willows and Sedges on Floodplains Landtype Association], yet this is a very important LTA on the Forest What is meant by, "because the data available are very general, this interpretation can only be made for forested LTAs" (DEIS page 3-43)? If the data are so general, how can it be used accurately to determine ecological condition of forested LTAs?**

Our Resource Information System database has a better characterization of cover type in forested ecosystems than it does in nonforested ecosystems Because of this, we can make a better estimate of ecological status For LTA10, and other nonforested LTAs, many of the cover types listed in our data base are listed as one grass species or generically as grassland That is not enough detail to make an ecological status determination We recognized this data gap (range condition baseline) in the Monitoring section of the Draft Plan, Research and Information Needs Assessment (Draft Plan page V-4)

1.91 **It is unclear why the Forest has no formal ecological classification for riparian areas The importance of riparian areas cannot be underestimated. We strongly encourage the Forest to gather the necessary data to determine both the ecological condition and the Structure Class for all LTAs, especially LTA 4 and LTA 10.**

We agree this is an important need The Forest did initiate riparian classification in 1995 The Forest was short of funding in 1996 and could not continue this effort We have identified this as an important research need in the Monitoring section of the Draft Plan (page V-4) Structure Class, as we defined it, only applies to forested sites

1.92 **Please consult studies to determine if the presence of roads may be a barrier to seed dispersal and the extent to which invasive species/noxious weeds have affected sensitive plants, special concern plants, and significant plant communities**

From the literature, we are not aware of roads causing a significant barrier to the seed dispersal of our special status plants However, there has been very little research on most of these plants We are revising the Monitoring section of the Draft Plan to better cope with long-term monitoring of all our special status plants Invasive and noxious weeds are always a concern We have a program in place to treat noxious weeds on an annual basis to keep their spread minimized (see DEIS pages 3-141 to 142)

1.93 **Our field observations indicate that the structural stage categories 4B, 4C, and 5 do *not accurately reflect or represent the quality of old-growth habitats. Also, using* Mehl's (1992) minimal criteria, none of the stands we surveyed met high quality old-**

growth habitats. This implies that estimates of true old-growth habitats on the RGNF are inflated.

The Regional Forester, in a 2410 letter dated September 28, 1992, declared the Mehl (1992) descriptions as the characteristics believed to represent old growth conditions in the Rocky Mountain Region You submitted old growth scorecards representing 11 Rocky Mountain Resource Information System (RMRIS) sites surveyed on the Forest The scorecards appear to be a version of the Medicine Bow National Forest old growth scorecard that various Forests in the Region have used and modified Of the 11 RMRIS sites you surveyed, 5 (45%) sites appear to meet the minimum quantitative Mehl (1992) criteria We assumed one site met the minimum age since no age data were reported, but the other attributes were readily exceeded We all need to keep in mind that this is a limited sample

In the DEIS, we said, "The acres of late-successional forest are an approximation of the Forest's old-growth" (DEIS page 3-136) Late-successional forest was defined as Habitat Structural Stages 4B, 4C, and 5 (or Structure Class 5) We still believe this statement is true, and we do acknowledge that this is an approximation of old growth The quality issue is very difficult to assess with the Mehl descriptions We never stated in the DEIS that late-successional forests equated "high quality old growth " The scorecard technique you used assigns a value to the various qualitative and quantitative attributes and then produces a ranking of old growth quality Old growth quality is value-laden depending on an individual's interpretation of what's better quality versus lower quality

We are revising the Forestwide Standard and Guidelines to do a better job of getting surveys for old growth accomplished We are also incorporating language that better recognizes the retention of old growth stands exhibiting a greater variety of structural elements such as diverse canopy layers, decadence in live trees, standing and/or downed dead, patchiness, etc (see Mehl 1992)

1.94 **Two obvious errors are found in the old growth section of the DEIS. First, the columns in Table 3-33 are misplaced. Also, Tables 3-6 through 3-10, which relate to economics, are referred to on page 3-136.**

You are correct We will fix these typographical errors.

1 95 **The DEIS uses "Structure Class" (DEIS page 3-44) which is different from "Structural Stage," a commonly used concept. This is confusing to the reader who is concerned about protecting old growth.**

Structure Class is an aggregation of Habitat Structural Stages Structure Class was carefully defined in the DEIS on pages 3-43 and 44 We will put the equivalent Habitat Structural Stages in a column or text with Structure Class to make the translation clearer in the Final EIS

1.96 **The DEIS only minimally addresses the potential adverse impacts of roads on plants and botanical communities. Please review our enclosed "Roads and Wildlife" bibliography.**

The DEIS (page 3-99) discusses the effects on plants from roads Most of the new road construction proposed in the DEIS would occur in subalpine, closed-canopy forestland The DEIS shows that there are no special concern plants typically found in this habitat There are no significant plant communities found in the subalpine zone (DEIS page 3-91)

We reviewed the literature list provided We could only find seven articles that remotely dealt with your comment These references were Chow (1970), Emmert and Buettner (1986), Lagerwerff and Specht (1970), Page et al (1971), Quarles et al (1974), Ross (1986), and Smith (1975) Based on the titles, these papers discuss heavy metal concentrations in vegetation and soil near roads (mostly highways) We feel this is not a significant concern when one acknowledges the scope of the Forest gravel road network in comparison to a paved highway system

1.97 It is irrelevant that "a majority of the late-successional forest on the RGNF would remain in an undeveloped condition" (DEIS page 3-112), since the old growth stands highest in quality for both wildlife and timber production could be cut while leaving a relatively large portion of the Forest with older trees.

Since a large portion of the Forest remains undeveloped under each Alternative, then there is a large amount of late-successional forests that remain unaltered and allowed to proceed under natural processes Your statement makes the assumption that the proposed cutting in the next ten-year period would cut all the remaining highest "quality" old growth If no one knows where this located, how could we target its demise? The old growth Standards and Guidelines are being revised to better articulate retaining old growth stands that exhibit characteristics that exceed Mehl's descriptions

1.98 What is meant by "habitat relationships" (Draft Plan page V-4, Research and Information Needs Assessment)?

This section of the Draft Plan identifies data gaps One of those gaps is to get a better sense for the habitat needs and uses by species that inhabit the RGNF

1.99 The Strategic Monitoring plan (Draft Plan page V-5) for biodiversity is inadequate. Comparing developed landscapes against reference landscapes will do nothing for biodiversity. What is meant by reference landscapes? Assessing "changes in habitat conditions" is too broad to be meaningful. The Tactical Schedule (Draft Plan page V-8, point number three), says to monitor "lists" of rare species, not to monitor the species' populations nor their habitats.

The Monitoring portion of the Draft Plan will be revised for the Final

1.100 The DEIS page 3-86 attempts to dismiss or minimize the nine plant species whose occurrences within the Tri-section appear limited to the RGNF by stating that these plants are found in more than one county in Colorado and in habitats that are not limited on the Forest. However, two plants, Aster alpinus var. vierhapperi and Ipomopsis multiflora, are ranked S1. Two other plants, Draba exunguiculata and Draba grayana are ranked S2. Thus, the threat to these plants becoming extinct or moving in this direction must not be so easily dismissed.

The DEIS does not dismiss these plants It tries to describe a context of risk that the Alternatives pose to these plants We were interested in whether the RGNF was the sole habitat provider for any of these plants We were also interested in whether there were habitats outside the RGNF that were suitable for these plants Our conclusions were that we could not find a clear risk posed to any of these plants by the Alternatives (DEIS page 3-80 to 100)

1.101 The dismissal of Botrychium palidum, a G1S1 species, is of serious concern Just because there is plenty of potential habitat for this species does not mean that it will recover, even if it is hard to see (DEIS page 3-86).

We are aware that this plant is considered extremely rare We are also very familiar with the habitat and the cryptic nature of this plant We believe the DEIS takes the available information on this plant and makes a reasonable risk judgement Our conclusions were that we could not find a clear risk posed to this plant by the Alternatives (DEIS page 3-80 to 100) Please keep in mind that there is also a Biological Evaluation process that assesses the impacts of site-specific activities on this and other Sensitive plants before any project is implemented

1.102 In the DEIS page 3-89, Table 3-22, how can Botrychium lanceolatum and B lunaria be more protected under Alternative D? The "150" entry for Carex limosa under Alternative E is obviously an error.

It is just the way the Management-area Prescriptions were laid out by Alternative Alternative D allocates the documented populations to Scenic Byways or Railroads (4 21)

versus the other Alternatives allocating to General Forest and Rangelands (5 11) or Forest Products (5.13)

You are right The entry for Carex limosa under Alternative E should have read 50% We will correct this for the Final

1.103 **The assumption on DEIS page 3-91, "that naturally functioning landscapes perpetuate special concern plants and significant communities" is misapplied here Landscapes on the RGNF are not functioning since they have been altered by years of human activities (timber cutting, construction, fire suppression, livestock grazing, etc) Possibly because of human activity, some plants, such as the ones discussed in this section and some others, have been reduced to small isolated relict populations.**

Our statement was taken out of context We used Management Emphasis Categories as a measure of how frequent or infrequent a special status plant occurred in an allocation which was potentially susceptible to habitat alteration Under the "Effects on Plants from Timber Management" section of the DEIS (page 3-91), we said that Management Emphasis Categories one through four were less likely to alter habitat We were just trying to describe the setting that these plants were in, by Alternative In other words, what was the chance of habitat alteration by Alternative for these plants? We still feel that Management Emphasis Categories one through four allow landscapes to be heavily influenced by natural processes and therefore pose minimal risk to special status plants

1.104 **The DEIS Page 3-97 states that adverse impacts to rare plants from livestock grazing could be avoided through "site-specific allotment planning and administration." This is theoretically true, but it will take up to 15 years to analyze all the allotments on the Forest. Plant species could go extinct by then. Also, it's hard to imagine that Forest Service monitoring of grazing would be sufficiently intensive and frequent to prevent rare plants from being eaten or trampled.**

There are several measures in place that address your concern while allotment management plans are being developed See the Resource Protection Measures in the DEIS page 3-88 Also, the Draft Plan (page III-8) addresses Standards and Guidelines for Range The Monitoring section of the Draft Plan (Chapter V) addresses compliance monitoring

1.105 **The DEIS does not adequately discuss introduced and extirpated species (DEIS page 3-140). Preserving diversity requires protecting all species no matter how small or uncharismatic, and it depends on restricting exotics and restoring native species/habitats. The DEIS is lacking in the most essential matters. The DEIS must be supplemented in order to analyze the extent of the problem and offer restorative strategies.**

The DEIS discusses this topic but readily admits that the implications of these introductions and extirpations are not well known The DEIS spent considerable effort considering the Forest's biodiversity through a Fine- and Coarse-filter approach (see DEIS pages 3-22 to 141) The intent of this approach was to give considerations to all species -- either by directly discussing the species or by evaluating habitat (by looking at how much habitat is altered by Alternative on the Forest) Some exotics are historically and socially acceptable (e g , some non-native fishes and domestic livestock) Other exotics are treated annually to reduce their populations (e g , noxious weed treatment) The Forest has a restoration strategy by identifying and restoring watersheds of concern (DEIS pages 3-210 to 235)

1.106 **The Draft Plan only contains two pages of Standards and Guidelines for protecting all biodiversity on the RGNF. The Forest Service cannot expect the public or the scientific community to believe that the smattering of weak S&G's presented in the Draft Plan will ensure protection of biodiversity on National Forest lands. The Draft Plan does not address the "full variety of life," or the "composition, structure, or function" of the ecosystems to be managed.**

Biodiversity is a very broad topic The Draft Plan has Standards and Guidelines for numerous topics We prefer to view all the Standards and Guidelines as Forest Direction

for managing the Forest's biodiversity The Draft Plan Page III-2 tells the reader to read the entire Forest Plan, including appendices to understand how all resources will be managed We will make this point clearer in the Final We believe that when the whole Draft Plan is considered, the variety of life (composition, structure, and function (process)) are adequately addressed under current knowledge

1.107 **Standards must be adopted to ensure protection of habitats needed by other sensitive species (e.g., bats, amphibians, and plants) on the RGNF.**

The DEIS (pages 3-80 to 100) spoke at length about the risks posed by each Alternative to special status plants There is also a Resource Protection Measures section (DEIS page 3-88) that exclusively addresses special status plants Because of this analysis, no Standard and Guidelines were developed specifically for specific special status plants

For wildlife, see 7 20 through 7 22

1.108 **The Monitoring section of the Draft Plan is inadequate. It is not clear how such things as predator control, fire management, fragmentation, non-native species introductions, or alteration of specific habitat components (e.g , snags) within a particular Structure Class will impact biodiversity. There is no way for the Forest Service to determine how the agency is "preserving and enhancing the diversity of plant and animal communities" on the Forest 36 CFR 219.27(g).**

The Monitoring section of the Draft Plan is being revised for the Final

1.109 **Biodiversity would be promoted better by not cutting timber or building roads in roadless areas.**

We are reviewing for the Final our proposed roadless area entries by Alternative

1.110 **The reference landscapes should consider slope, aspect, soil conditions, and *surrounding forest types. Not just "patch size distribution" and "distance between* patches." (Draft Plan page III-7, Number 2, Aspen)**

The Reference landscapes do consider the attributes you mentioned Reference landscapes are based on Landtype Associations (LTAs) See the DEIS pages 3-41 to 74 for a complete description of the LTAs on the RGNF The LTAs are categorized based on similar environmental conditions and similar vegetation expression "Surrounding forest types" is considered in landscape composition

1.111 ***The Forest is remiss in dismissing the impacts of grazing special status plants on* forested ecosystems. "Plants associated with closed-canopy forestland were also excluded from this analysis assuming that these habitats have low susceptibility to livestock grazing." (DEIS page 3-93) Yet, I have seen cows in forested areas on the RGNF**

The analysis for special status plants judged risk due to livestock grazing The analysis said, "plants strongly associated with rocky habitats are assumed to be relatively unavailable to livestock grazing In addition, plants associated with closed-canopy forestland were also *excluded from this analysis assuming that these habitats have low susceptibility to* livestock grazing " We think this was reasonable since livestock do not spend the major proportion of their time in closed-canopy forestland There simply is insufficient forage available Thus, the risk to special status plants, under the conditions described, should be low from grazing

1.112 **The Forest needs to conduct a scientific evaluation of the effects of Forest Service management practices on the sustainability of forest ecosystems in the RGNF The sustainability of all wildlife habitats should be central to this effort. In particular, the *Forest must address the impact of its logging, grazing, road building, and* recreational programs in TES habitats in its first ten-year planning period.**

Chapter One of the DEIS explains the purpose and needs for revision and the significant issues

1.113 **The Forest needs to develop a pro-active biodiversity protection plan that will result in continuous mitigation and correction. Sufficient funds must be committed to implement these plans Include action plans at both forest and district levels, including target dates and identification of those officers responsible for implementing these plans**

The Draft Plan contains a Strategic and Tactical Monitoring plan This section is being revised for the Final

1.114 **The threats to natural diversity on the RGNF come from within the Forest through extractive activities such as logging, road building and maintenance, grazing, and recreation. Increasingly important are threats from outside the boundary of the Forest, including ground level ozone pollution, acid deposition, exotic species, accelerated climate change, and fragmentation of private lands. We urge you to address these threats in the DEIS and Plan.**

Chapter Three of the DEIS discusses the relevant topics by Alternative

1.115 **Develop an Alternative which identifies natural areas on the RGNF (and adjoining federal, state, and private lands) where ecosystem integrity is largely unaltered by human activity (roadless areas, remnant old growth, etc.). An adequate conservation Alternative must include these critical core areas and wildlife movement corridors between them. This Alternative must protect the full array of natural diversity on the RGNF. Essential to this thinking is the establishment of core reserve areas, linked with other core areas by biological corridors. Both core areas and corridors must be sufficiently buffered from human development.**

All Alternatives zone the Forest into prescriptions that allow designated activities Some Alternatives allow more human influence than others, while still striving for perpetuating sustainable ecosystems (see DEIS pages 2-17 to 18)

Alternative F takes this concept the farthest by formally designating conservation reserve core areas and corridors in the Management-area Prescription mix All alternatives are a mixture of ecocentric and anthropocentric values (see DEIS page 2-1 to 24).

1.116 **The Forest should identify the most intact watersheds in each ecosystem You should identify and map outstanding natural areas and biodiversity "hot spots" within these watersheds, as well as rare natural communities. Ground-truthing is required as part of this effort.**

See the watershed discussion in the DEIS pages 3-210 to 235 We have evaluated all the Colorado Natural Heritage Program occurrence elements on the RGNF and proposed Research Natural Areas and Special Interest Areas as deemed appropriate

We agree that ground-truthing is important and we are revising the Monitoring section of the Plan

1.117 **The Forest should develop a detailed landscape management plan for each ecosystem of the Forest. Integrate all TES habitat requirements. Include affirmative, accountable, pro-active plans for all sensitive species**

The Forest predominately used Landtype Associations (DEIS pages 3-41 to 74) as background reference from which to evaluate effects of proposed activities by Alternative

The TES species were specifically addressed in the DEIS pages 3-80 to 100 (plants) and 3-113 to 132 (animals) The Monitoring plan addresses accountability to Sensitive species

1.118 **Monitoring should include the variables of ecosystem integrity, which include water and sediment yield, nutrient loading, fire fuel loading, air quality, timber growth**

rates and yield, and population dynamics of TES species. How will this monitoring be accomplished?

There is a Monitoring section in the Draft Plan (Chapter V) that addresses what we feel are the key attributes of the RGNF's environment that we can reasonably monitor This section is being revised for the Final

1.119 **We recommend the following criteria for developing a conservation reserve system for the RGNF:**

1) Core Areas:

Consider all unroaded areas larger than 1,000 acres as potential core areas, and other areas where a core reserve of this size could be created by eliminating an off-road vehicle (ORV) or logging road. Examine possibilities for consolidating or expanding these areas by protecting adjacent or interior private parcels secured through land trades, transfer of development rights, conservation easements, acquisition, or cooperative agreements. Analyze adjacent state and federal public lands for opportunities to expand core area function/protection. Core areas should include all of the following:

a) RARE 2 Roadless areas.
b) Existing and proposed RNAs.
c) Natural Heritage sites.
d) Centers of species richness or endemism (biodiversity hot spots).
e) Areas known to be occupied by TES species.
f) All unroaded areas of any size contiguous to existing Wilderness areas.
g) Assure that all vegetation communities are well represented across their range of variability (use road closure or restoration to achieve this goal if necessary).
h) Assure that core areas are large enough to encompass the home ranges of all native wildlife species and maintain minimum viable populations in natural patterns of abundance and distribution with emphasis on sensitive and declining species.
I) Assure that core areas include all types of vegetation and seral stages necessary for habitat-specialized species.
h) Assure that areas are large enough and shaped in such a way as to prevent edge effects for all edge-sensitive species.

2) Corridors.

Identify dispersal-sensitive species which require corridor protection and types of corridor designs and habitats these species require. Establish corridors in areas known to be in use by TES species. Analyze where corridors should be established to logically connect core areas. Locate corridors in areas of lowest density. Locate corridors to allow for upslope-downslope directional connections. Ensure corridors *are, at minimum, three times the width of edge effects* and will otherwise function as intended. Look for places to locate structural wildlife crossings where large highways or major roads obstruct dispersal. Develop systems to monitor the *effectiveness of wildlife corridors.*

3) Buffer Areas:

Evaluate the ability of core areas and corridors to withstand surrounding human uses, for example, ORVs, exotic species invasion, edge effects, etc. To prevent *intrusion and add supplementary habitats, draw boundaries for buffer areas around* cores and corridors and manage to be compatible with core use.

4) Goals of reserve system:

Assure that the reserve system has representation of all native communities. It needs to maintain minimum viable populations of all native species (all TES in particular). It needs to maintain natural processes. Finally, it needs to accommodate change,

including worst-case scenario combining the impacts of human activities with natural catastrophes.

The intention of each Alternative was to provide for sustainable ecosystems See DEIS pages 2-17 to 18 for a quick summary of the key attributes used to make this determination Each Alternative places a slightly different emphasis on how strong a role humans play in the management of the Forest We believe that each Alternative provides for sustainable ecosystems while providing some level of human influence

Only Alternative F specifically identifies a formal reserve system, while the other Alternatives propose a mix of Management-area Prescriptions which effectively function as a reserve system The other Alternatives propose a management scheme to manage the "matrix" (manage for natural landscape diversity) This approach essentially zones the Forest with Management Emphasis Categories Conservation reserves and connective corridors are present without being labeled as such The DEIS page 3-138 shows the amount of land allocated to Management Emphasis Categories one through four We believe these categories allow natural processes to dominate these landscapes We also believe the focus should be on the matrix rather than on a conservation reserve system in a Coarse-filter approach to the conservation of biodiversity Our concern with a rigid conservation reserve system is that it cannot cope with all relevant scales of biodiversity

1 120 **We ask that special management attention be given to the habitat needs of the following species:**

Plants: Ripley's milk-vetch, pale moonwort, Smith's whitlow-grass, white-bristle cotton-grass, false Indian-parsley.

Amphibians and Fish: western boreal toad, northern leopard frog, Rio Grande cutthroat trout, tiger salamander.

Birds: black swift, boreal owl, burrowing owl, ferruginous hawk, flammulated owl, fox sparrow, Golden-crowned kinglet, northern goshawk, Lewis woodpecker, loggerhead shrike, olive-sided flycatcher, osprey, pygmy nuthatch, three-toed woodpecker, white-faced ibis, Mexican spotted owl.

Mammals: grizzly bear, dwarf shrew, marten, North American lynx, North American wolverine, Thompson's big-eared bat.

Comprehensive conservation assessments and management plans must be developed and implemented for all of these species. The management plans for each should include detailed management prescriptions, standards, and guidelines.

Plants All of the plants mentioned were addressed in the DEIS (see the DEIS pages III-80 to 100, Appendix E, pages E-1 to 11, and Appendix F, pages F1-1 to 7

Animals All of the wildlife mentioned were discussed in the DEIS pages 3-113 to 132 and Appendices F and G

1.121 **We recommend setting aside and protecting all TES habitats on the RGNF as a Biological Reserve. All large-scale commercial timber harvesting and associated road building should be phased out within this area.**

We feel that multiple use and TES species can exist together The Biodiversity Assessment (DEIS pages 3-22 to 141) goes to considerable length to describe the risk to species and habitat, by Alternative, using existing information. There is also a site-specific Biological Evaluation process which must be completed before any project is implemented

1.122 **Non-native species (e.g., cows) cannot be justified in routine use and should be controlled in all ecosystems. These species would not have been present in natural landscapes, and consequently, their very presence is outside the Range of Natural Variability.**

We recognize that non-native species did not evolve with the ecosystems on the RGNF and, therefore, are outside the Range of Natural Variability However, some species are socially desirable Proper domestic livestock grazing on the Forest is an acceptable multiple use on these lands

1.123 An analysis needs to be made of the impacts of moose introductions on Carex limosa and Comarum palustre (DEIS page 3-94)

The riparian Standards and Guidelines apply to all species, which should ensure the long-term health of riparian areas Neither plant species is known to be a preferred forage species by moose Both of these species are ranked G5 (globally very common) by the Colorado Natural Heritage Program It is doubtful that moose use of riparian areas on the RGNF will lead to a global decline of these species We do not anticipate a conflict between the projected moose population on the RGNF and these two plant species

1.124 The RGNF lacks inventory and research on most vertebrate species (e.g., marten), nonvertebrates, vascular and nonvascular plants in old-growth forests. Studies should be designed to examine the continuum of old-growth stages (e.g., young/old growth to old/old growth).

We agree that we need to keep improving our flora and fauna inventories on the Forest Detailed study of the continuum of old-growth stages is probably more appropriately directed to, and conducted by, the Rocky Mountain Forest and Range Experiment Station

1.125 Without standards for vertical and horizontal diversity (i.e., limiting how much forested habitat can be put into an early successional stage at any given time for a given area), the revised Draft Plan will not actually provide for the diversity on the RGNF, in violation of NFMA and the planning regulations.

It is critical to acknowledge the amount of land allocated to Management-area Prescriptions which allow timber harvest, by Alternative This, coupled with Standard and Guidelines, greatly restricts how much timber can be harvested The DEIS discusses, by Alternative, the change in forest Structure Class posed by timber harvest (DEIS page 3-162) The result is that the vast majority of the Forest continues to change through natural processes Consequently, we feel that we provide for natural landscape diversity over the majority of the RGNF

1.126 How can the RGNF determine that, "large amounts of late-successional forest habitat will remain outside the Forest boundary" (DEIS page 2-18)?

See the narrative for Timber Resource in the Province discussion (DEIS page 3-26) and in the Tri-section discussion (DEIS page 3-35) These sections describe how the vast majority of forested landscapes outside the RGNF boundary will continue to change through natural processes of fire, insect and disease, and growth and death A relatively small proportion may be harvested Thus, late-successional forests outside the RGNF will predominately continue to change through natural processes

1.127 There is recognition in the DEIS (page 3-135) but not in the Draft Plan that management of forests to create old-growth conditions is possible. There is no indication that such management will occur as the Draft Plan is put into practice. It would seem old growth can be encouraged through management and wood products can be removed for commercial use at the same time.

We quoted research by Kaufmann (1992) that said it might be possible for people to purposefully intervene early in a stand's development and have a significant influence on the eventual old-growth characteristics Careful treatment could conceptually improve the longevity of old-growth stands However, many environmental factors make it difficult to predict when and for how long a stand will be old growth This is really an area that needs more research before it can be implemented on a large scale

1.128 The paper by Erhard et al. (1995) states that they will increase the proportion of SF2 and SF3 landscapes by cutting the SF5 landscape for the Jarosa Mesa landscape. How is this possible? Won't the harvested SF5 acres transform into SF1 acres?

The paper provides several management options for the Jarosa Mesa landscape If harvesting is dominated by uneven-aged management, then it is possible to change late-successional forest (SF5 stands) into earlier seral stands (SF4, SF3, or SF2) without taking stands all the way to the earliest seral condition (SF1)

1 129 The statement that timber management will be within the Range of Natural Variability (RNV) is not consistent with the statement under biodiversity mentioned in the previous paragraph that talks about the new program for habitat conditions are outside RNV (DEIS page 2-7). There are not parallel statements for the other Alternatives so it is implied that this is the only Alternative that will cause habitats to move outside the RNV.

We think it is Where habitat conditions are outside the Range of Natural Variability, we want to begin restoration However, we will ensure better consistency in this language, by Alternative, for the Final

1.130 The study described by Erhard et al (1995) only describes the current condition of the reference areas -- the patch sizes and shapes, etc It is well known that fires burned through much of what is now the RGNF about 160-200 years ago. There were also extensive human-caused fires between 1875 and 1908 (DEIS Appendix A, page A-13). Thus, the current landscape may reflect a condition that is relatively early in the fire cycle Without additional information, including fire histories, the Erhard et al. study must not be used to determine how to manage the Forest

The study by Erhard et al describes 14 relatively unaltered Engelmann Spruce on Mountain Slopes Landtype Association (LTA1) reference areas The paper discusses why these reference areas form what we believe to be a reasonable reference (page 5 of Erhard et al) These areas have been minimally altered by humans and have had minimal alteration to natural ecologic process Thus, we feel they are the best reference available for making comparisons to our more intensively managed landscapes within LTA1

Historic, natural wildfire did not completely burn these reference landscapes They burned in a natural mosaic The current aspen pattern typically reflects the most recent catastrophic fire pattern It is true that humans accelerated the fire frequency around the turn of the century We do not have a precise figure on the extent of this influence in LTA1 Dubois (1903) describes the land now within the RGNF as having been repeatedly burned, except for stands of Engelmann spruce at the heads of creeks. This may indicate that humans did not have a widespread influence on the fire frequency within LTA1 around the turn of the century Since we wanted to incorporate as much of the natural landscape diversity as possible, each reference area had to have a minimum of 8,000 acres of LTA1 to be eligible Thus, the large size of these 14 reference landscapes should help minimize post-settlement alteration of the fire return interval We believe that conducting spatial analysis helps Forest personnel plan activities such as timber sale layout, recruiting late-successional forest, maintaining habitat connectivity, and perpetuating ecologic diversity on actively managed timberlands

1 131 The small number of very large patches (greater than one thousand acres) as shown in the Erhard et al. (1995) paper and in the DEIS (page 3-109) indicates that they may be very valuable and must not be carved into smaller patches.

In the conclusion section of the paper by Erhard et al there is a discussion about using the spatial analysis approach The approach does not dictate how closely a landscape should mimic reference conditions, nor how quickly These decisions will be done on a case-by-case basis with public input on each project We agree that the few large patches are undoubtedly valuable and careful thought is needed before a decision is made to reduce their size

1.132 **What is the basis for the statement, "older ponderosa pine forests were not widespread or abundant" (DEIS page 3-26). It is highly likely that such forests were abundant within the range of ponderosa pine on or near what is now the RGNF.**

The statement meant that there never was a large amount of old growth ponderosa pine within the cover type due to the frequency of fires and insects and disease See the cover type breakdown for the Province on DEIS page 3-23 If old growth were present, it was likely in open, park-like conditions on the landscape

1.133 **The proposed reductions in the timber sale program under the Experienced Budget level of the preferred Alternative are not only unnecessary, but contrast sharply with the apparent management problems of not managing the Forest, and at the same time suggest significant potential benefits to the Forest itself from a forest management program. See DEIS page 3-[1]39; Appendix A, A-39; and DEIS page 3-178. If these statements are true, then the Forest has not lived up to its responsibilities of forest management in the Preferred Alternative.**

We disagree We feel we are managing the entire Forest Timber harvest is just one tool to manage the Forest. Our intent under Alternative D was not to put all the suitable timber acreage under Management-area Prescriptions which allow timber harvest Thus, the majority of forested acreage on the RGNF will proceed to change by natural processes This does mean that there may be an increased incidence of high-intensity fires or insect and disease outbreaks in the future Please review the DEIS pages 2-8 to 10 for a discussion of the background, theme, and how Alternative D responds to each revision topic Then review the Management-area Prescription allocation map where timber harvest is allowed This, coupled with Standard and Guidelines, restricts the amount of timber harvest on the Forest

1.134 **If one flies over this area, one of the most disturbing aspects is that almost all flat-lying areas have been cut over. Surely these fossil lava flow areas are a unique ecosystem in their own right. Again we see logging in the most fertile areas.**

Volcanic flows, by nature, produce landforms that often are characterized as mesas They are neither atypical nor unique for volcanic areas Mesa tops have been harvested in some places and are expected to have few soil erosion concerns since slopes are gentle Harvesting steeper slopes poses increased risks of erosion, and are usually avoided Roads constructed to access timber on more level slopes are less expensive to build and maintain, result in less soil and water disturbance, are less visible from surrounding areas, and allow easier access for public fuelwood gathering While mesa top soils may be very productive, they are not the most productive soils on the Forest The most productive soils occur on landslide deposits, and with few exceptions, these lands were deemed unsuitable for timber production

Historically, about 7 7% of the Forest has been affected by timber harvest (DEIS page 3-147) If you look at the Management-area Prescription allocation maps for each Alternative, most of the Forest proceeds to change under natural processes (DEIS page 3-153 to 158)

1.135 **The Coarse- and Fine-filter approaches mentioned for Alternative B in Chapter Two of the DEIS (page 2-7) are expected to be used in all alternatives under the ecosystem management philosophy, so it is of question why they are stated here and not with the other Alternatives.**

It was stated for all other Alternatives except NA and F We will make that correction in the Final EIS

1 136 **The Erhard et al. (1995) paper would be far more instructive if the authors would identify what plant and animal species are currently impaired in terms of dispersal and viability on intensively managed landscapes. Does animal abundance diminish on intensively managed landscapes? Which animals?**

We did not initiate spatial analysis (Erhard et al 1995) with a focus on any particular species Our analysis was intended as a Coarse-filter approach to conserving biodiversity We wanted to get a sense for natural landscape diversity in the Engelmann Spruce on Mountain Slopes Landtype Association Our goal was to use this information to help us better manage the spatial patterns we create through vegetation manipulation

1 137 **Are diversity indices lower on intensively managed landscapes? Are intensively managed landscapes unnaturally fragmented? What is the threshold value used to determine if unnatural fragmentation is occurring (RE: Erhard et al (1995))?**

There are numerous diversity indices, so it depends on which diversity index is used and how it is interpreted There is also a question of scale Diversity can be measured at the genetic, species, community, or landscape scale within a landscape

The fragmentation question depends on the type and intensity of timber harvest Our analysis focused on differences in the attributes described in the paper by Erhard et al and less on making a determination of fragmentation We do believe that a road network fragments landscapes We set no threshold of fragmentation since we did not know what that would be This is an important reason why we did not suggest how closely nor how quickly a landscape should mimic reference conditions as stated in our conclusions

1.138 **Ecologic pattern should be analyzed at more than one scale Land management planning should consider all scales of ecological organization. There is no indication that the authors attempted to address the question of scale (RE: Erhard et al (1995))**

If you look at Erhard et al in combination with the DEIS (pages 3-5 to 142), a multi scale assessment was made for the RGNF

1.139 **Do intensively managed landscapes impair the sustainability, biodiversity, stability, and natural variability of the entire Forest (RE: Erhard et al. (1995))?**

No. Please see our statements and summary about sustainability in the DEIS (pages 2-17 to 18)

1.140 **If one considers the Zonneveld concept of ecosystem management (Jensen and Everett 1994), it is clear that the integration of societal desires and requirements, and economic considerations have been omitted in this white paper (RE: Erhard et al. (1995)). The land evaluation process in ecosystem management should determine the desires and requirements of people who will be influenced by the planning outcome.**

The paper by Erhard et al was only meant to guide management activities that are the result of implementing an Alternative Each of the Alternatives described in Chapter Two of the DEIS takes into account the needs and wants of society Chapter Three of the DEIS describes in detail the impacts on society of implementing each proposed Alternative The paper by Erhard et al. has to be used in conjunction with the DEIS and Draft Plan When this is done, the conceptual framework adapted from Zonneveld is followed quite closely

1 141 **The public should know how much change in timber harvest will occur if the new management scheme on the RGNF is adopted (RE: Erhard et al. (1995)). How will this affect local economic stability?**

The analysis process described in Erhard et al was not a constraint in FORPLAN Thus, this process does not restrict timber harvest relative to other constraints in FORPLAN Economics was described and analyzed in the DEIS (pages 3-364 to 385)

1.142 **What are the risks of adopting a system that governs intensively managed landscapes by making them similar to the average land coverage proportions found in roadless and wilderness areas (RE: Erhard et al. (1995))?**

We are not clear we understand what kind of risk you are referring to Are you asking about ecological risk, social risk, or economic risk? We believe the ecologic risk is minimal since the Forest proposes to harvest relatively small acreage relative to the total forested

land base over the next ten-year period The social and economic risks are minimal since the spatial analysis was not a constraint in FORPLAN. Therefore, there is no impact on Allowable Sale Quantity (ASQ) by using the Erhard et al approach

1.143 Knowing that dense stands with overmature, large diameter, Engelmann spruce trees are susceptible to spruce beetle attack (Alexander 1986), what are the risks to forest health if more land is placed in the SF5 land type? Will the risks of wildfire increase for intensively managed landscapes if they mimic the fuel load and fuel hazards of roadless and wilderness areas (RE: Erhard et al. (1995))?

For each Alternative, the Forest will perpetuate a large amount of acreage in the SF5 Land Type category The Erhard et al approach will not drive the amount of SF5 remaining on the entire Forest -- the Alternatives do this The Erhard et al approach will help drive the spatial configuration of SF5 within project areas on the Forest The same can be said of wildfire risk The Alternatives frame the basis for wildfire risk -- not the approach by Erhard et al The DEIS discusses the impact of the Alternatives on insect and disease risk (DEIS page 3-178 to 191) and on fire risk (DEIS pages 3-192 to 202)

1.144 What will be the decline in volume growth if intensively managed landscapes are managed to mimic the average conditions found in roadless and wilderness areas (RE: Erhard et al. (1995))?

The decline will be inconsequential because the Erhard et al approach will only be applied to a very small amount of acreage by Alternative (i e , the acreage proposed for timber harvest in the Engelmann Spruce on Mountain Slopes Landtype Association over the next decade)

1.145 It is difficult to believe that the 14 reference areas represent the full potential range of natural landscape diversity. Was the selection of the 14 areas random? Since wilderness areas are not established by randomly selecting natural landscapes, how representative are wilderness areas (RE: Erhard et al. (1995))?

No, the selection of the reference areas was not random The reference areas represent what we believe to be the best representation of natural landscape conditions in the Engelmann Spruce on Mountain Slopes Landtype Association (described on page two and three of Erhard et al) The RGNF has a large Wilderness acreage and much of it is Engelmann Spruce on Mountain Slopes Landtype Association (LTA1) Consequently, Wilderness watersheds in LTA1 were selected as part of the reference where the attributes of elevation range, slope, and aspect closely matched the intensively managed landscapes. We discarded many Wilderness watersheds because their physical attributes were too different from the intensively managed landscapes

1.146 Why should the developed spruce/fir Land Type spatially conform to the template of the 14 roadless and wilderness areas? Ecosystem management must balance the need for commodity production against ecological objectives by maintaining an ecosystem in its natural range of variability Yet Erhard et al. (1995) have chosen to ignore the issue of natural variability. They wish for the intensively managed landscapes to appear similar to the average of the 14 roadless and wilderness areas (RE: Erhard et al. (1995)).

The objective of Erhard et al was to identify the best representation of natural, undisturbed spruce/fir landscapes on the Forest Then, key spatial pattern metrics were selected to characterize these baseline landscapes The reference landscapes would be helpful if they could provide a template to guide activities such as timber harvest, recruit late-successional forest, maintain habitat connectivity, and perpetuate habitat diversity on actively managed timberlands A premise was, if natural, undisturbed landscape patterns were mimicked on intensively managed landscapes, then plant and animal species dispersal and perpetuation would not be hampered Also, the spruce/fir landscape would not become unnaturally fragmented

The reference condition incorporates the variability of 14 large reference landscapes We disagree that we are not managing for natural variability The analysis process we used is

as follows Land Type distribution and patch size distribution data were separately summarized and categorized into respective tables For each table, a chi-square goodness-of-fit comparison was conducted between the summarized reference condition data against the two test landscapes Chi-square analysis looks at the relationship of nominal (counts of categorized data) between sample data and a theoretical distribution It is often desirable to obtain a sample of nominal scale data and make an inference as to whether the population from which it came conforms to a particular theoretical distribution One of the powerful uses of chi-square is that the distribution of the sample data (test landscape in this case) can be compared to the theoretical distribution (reference conditions) For example, the proportion of Land Type SF4 relative to SF5 is an important difference (see Figure 1, Erhard et al) Based on the 14 reference landscapes, each reference area always contains less SF4 than SF5 This is undoubtedly a critical piece of spatial information that we have never realized nor pro-actively managed for Thus, we see that there are corresponding relationships among all ten Land Types This variability is reflected in the reference condition shown in the paper (Figures 1 and 2)

1.147 If the proportion of SF5 on the reference landscapes varied from 27% to 78%, it is perplexing to understand why the RGNF wants the intensively managed landscapes to contain 51% of SF5 (RE: Erhard et al (1995))?

Each of the 14 reference landscapes was categorized into ten Land Types For each Land Type, there was a range of values (you have quoted the range of values for SF5). If one looks at the Land Type distribution data for each of the 14 reference areas, you will see that seven out of ten Land Types contain zero acres in at least one of the reference landscapes Does this mean that the reference landscapes are variable? Yes Does this mean that we ignore the relationship between Land Types and manage for extremes in the range (zero in this case)? We think not If we did manage for the extreme (for example, set seven out of the ten Land Types to zero acres in our intensively managed landscapes), it could lead us to manage for a landscape condition that either rarely or never existed in the evolution of these landscapes We think a more conservative approach is to manage for the relative relationship between the summarized 14 reference landscapes and not manage for an extreme condition

1 148 Are any of the 14 roadless and wilderness areas significantly different from their average? If so, what management prescriptions are the planning personnel advocating for the natural areas, so that they conform to the average conditions found on roadless and wilderness areas (RE: Erhard et al. (1995))?

The approach described by Erhard et al was meant for guiding human-caused activities Yes, the reference landscapes were variable as one might expect for natural landscapes But, the reference landscapes were shaped by natural processes There is a difference between natural processes and human-caused activities Obviously, there is no natural process that removes boles and creates a road network like timber sale activity We can only mimic a portion of natural process with timber harvest We believe that if we are going to manipulate forested habitats, it is reasonable to have a spatial template from which to make choices

1.149 The Erhard et al. (1995) paper is not clear on how the distance between SF5 patches was used in the analysis Was the average distance of 745 feet significantly different between the average of the 14 roadless and wilderness areas and the intensively managed landscapes? Was this the distance between patch centroids? How will this information be used in the implementation of the management options described on pages nine and ten? Given the mean value of 745 feet with one standard deviation of 925 feet, and using a t value of 1.96, are we to assume that 95% of the patches are apart by a range of -1,068 to 2,558 feet? These results seem unrealistic Through a series of assumptions and calculations, I figure that patches are 770 feet to 4,015 feet apart.

We only looked at two intensively managed landscapes for our analysis (Jarosa Mesa and Cross landscapes), so we do not know the mean patch distance metric results for the rest of the intensively managed landscapes on the entire Forest FRAGSTATS makes the patch distance calculations and it is done from a patch edge to a patch edge -- not patch

centroids The description for how this metric was used was described on page eight of Erhard et al *The distance metric was intended to help a team spatially configure their* patch layout while using the other metrics described in the paper FRAGSTATS electronically calculates mean SF5 patch distances using the actual SF5 patch distances, so it is accurate

1.150 **On pages nine and ten of Erhard et al (1995), I find some of the management options either disturbing or confusing. The first option for the Jarosa Mesa landscape suggests that by following the "no action" alternative, a stand replacing fire could rearrange the Land Type configuration in the landscape Are the authors suggesting that they will not engage in fire suppression if the no action alternative is selected? I *hope not.***

The management options were hypothetical examples of choices Conceptually, the landscape could be left alone and a wildfire could eventually rearrange the Land Type distributions In fact, in the evolution of these landscapes, this is precisely what has happened repeatedly over long periods of time However, we have Standards and Guidelines for Management-area Prescriptions 5.11 and 5 13 that address fire suppression (Draft Plan page IV-34 to 36)

1.151 **The authors have stated in option 2a for the Jarosa Mesa landscape that they will *increase the proportion of SF2 and SF3 Land Types by cutting the SF5 Land Type.* How is this possible? Won't the harvested SF5 acres transform into SF1 acres (RE: Erhard et al. (1995))?**

If uneven-aged management is used, then SF5 Land Type acres could be converted to a variety of earlier seral Land Types as discussed in the paper

1.152 **I laud the decision in option four for the Cross landscape to consider uneven-aged management. Of course, this is only a start. What will be the q-ratio, maximum diameter, and residual basal area for management? What will be the cutting cycle (RE. *Erhard et al* (1995))?**

These are questions answered at the project level

1.153 **Have the authors developed a good relationship between basal area and canopy closure? This relationship is needed unless the RGNF is prepared to issue cutting guidelines to a residual canopy closure instead of a residual basal area (RE: Erhard et al. (1995)).**

The Forest's use of Habitat Structural Stage and its reliance on crown closure classes for pole-sized and mature-sized trees ties indirectly to the high correlation between the width of tree crowns and the tree's diameter -- and the resulting affects on growth and size as competition between trees increases A stand density method has been developed around this principle, called the "crown-competition" method A major advantage of this method is that it is independent of age and site (Daniel et al 1979)

1.154 **The premise in the introduction of the paper by Erhard et al. (1995) that, "large landscapes . . . probably have some predictable pattern of spatial configuration at coarse levels of resolution" is disturbing. It looks like a tremendous amount of time and effort was spent analyzing the landscapes on the RGNF for some pattern that may not even exist. This paper even says it may not exist. Even if patterns are found to exist, this type of management is not founded in regulation or law (RE: Erhard et al. (1995)).**

The reasons for conducting the analysis are clearly stated in the paper on pages one and two There is no place in the paper where we state that patterns may not exist Our basis for conducting spatial analysis comes from an interpretation of what Ecosystem Management means in the Forest Service and how to consider biodiversity in the Plan revision The DEIS page 1-5 discusses this shift in management philosophy The philosophy tries to meld the ideas of 1) sustainable ecosystems, 2) sustainable economies, and 3) sustainable social needs We view spatial analysis as one means for gaining a better

understanding of the landscape diversity on the RGNF We do not want to create a landscape condition that rarely existed in the past Our assumption is if we manage most ecosystems within their evolved composition, structure, and process, then most, if not all, species can probably perpetuate themselves We know we cannot do this on every landscape and at every scale, but we want to be aware of all our activities and their cumulative effect

1.155 **The paper by Erhard et al. (1995) notes that limitations of the original resource data available The authors state that stand age classes would have been preferred but were not available in the Rocky Mountain Resource Information System (RMRIS). This is a field in RMRIS.**

Stand age only resides in the database where there has been Stage II timber inventory For the RGNF, this inventory only covers approximately one third of the Forest This is why we used Habitat Structural Stage This attribute is coded in our database for all forested sites on the RGNF

1.156 **Another concern is that the objective is to, "identify the best representation of natural, undisturbed spruce/fir landscapes on the Forest " Why are we now managing this National Forest with the objective of appearing undisturbed? The idea that this Forest is to be managed always to look just like its present condition is impossible and it is not based on any law or regulation (RE: Erhard et al. (1995)).**

We are not managing the Forest with an objective of appearing undisturbed Our statement has been taken out of context The object was clearly stated in Erhard et al as follows·

> The objective of this work was to identify the best representation of natural, undisturbed spruce/fir landscapes on the Forest Then, key spatial pattern metrics were selected to characterize these baseline landscapes The reference landscapes would be helpful if they could provide a template to guide activities such as timber harvest, recruit late-successional forest, maintain habitat connectivity, and perpetuate habitat diversity on actively managed timberlands A premise was, if natural, undisturbed landscape patterns were mimicked on intensively managed landscapes, then plant and animal species dispersal and perpetuation would not be hampered Also, the spruce/fir landscape would not become unnaturally fragmented

1 157 **How would one make a change in Land Type distribution on the Jarosa Mesa landscape from SF5 to SF1, SF2, or SF3 (RE: Erhard et al. (1995))?**

The paper by Erhard et al states on page nine, under option 2a, that timber harvest could be used to decrease the proportion of SF5 to earlier seral conditions of SF2 or SF3 on the Jarosa Mesa landscape A variety of silvicultural treatments could be used to accomplish this

1.158 **The application of the RGNF's spatial analysis theory is set forth as a Guideline in the Management-area Prescriptions for 5.11 and 5.13 With the imposition of this theory as a condition of any project, it seems the project would not happen The project would have to take the forest toward the reference. By creating any patch the direction is away from the reference (RE: Erhard et al. (1995)).**

We do not understand how the analysis approach described by Erhard et al would lead one to conclude that there would be no timber harvest activity The paper gave two test landscape examples on the RGNF that showed how the analysis process could be used Both examples allowed timber harvest We believe the approach is helpful to a team by giving some direction on which Land Type categories should be avoided and which categories may provide harvest opportunities

1.159 **It is not reasonable to consider the perpetuation of a stand by holding it in the same structural stage category for the long term. The process proposes individually to select trees in the 5C category, leaving the remaining stand still as 5C. Over the long**

term this is not practical silviculture and may not be biologically possible (RE: Erhard et al. (1995)).

The paper by Erhard et al makes no mention of a structural stage category 5C The process does not restrict the silvicultural methods that can be used Based on two test landscapes, the process does make suggestions for how to manipulate Land Types using various timber harvest methods.

1.160 **The RGNF needs to include specific Structural Stage/Structure Class objectives as part of the Desired Future Condition and the Forestwide Standards and Guidelines. In our view, this type of decision is a significant role of the Plan. Then both the public and the project ID Teams would have a clear picture of objectives for project planning and analysis and the implementation could be quantitatively monitored.**

The Forestwide Desired Conditions, under Biological Diversity, say, "Habitat composition (including seral stage), structure, and pattern (including connection), and disturbance frequencies similar to those that result from natural disturbance regimes will be maintained to the extent possible given legal and policy limitations, and the desired condition for the area " The spatial analysis approach by Erhard et al (1995) describes a method (based on reference landscapes) for comparing the Structure Classes that would be expected in the Engelmann Spruce on Mountain Slopes Landtype Association (LTA1) This LTA is where most of the proposed timber harvest is planned The spatial analysis process is listed as a Guideline for Management-area Prescriptions 5 11 and 5 13

1.161 **The language in the Draft Plan and DEIS of how reference analysis areas would be used is confusing and must be improved. For example, Figure 1 in Erhard et al. (1995) uses Land Type distribution as the basis for comparison with the reference landscape. Figure 3-29 in the DEIS uses Structure Class by Cover Types as the basis for comparison, while the Draft Plan Guideline for Management-area Prescriptions 5.11 and 5.13 is to, "Use landscape spatial analysis . . . ," and "The intent of modeling would be to not worsen the overall difference . . . when comparing . . . to the reference landscape." The paper by Erhard et al. further confuses the issue by stating that, "A Forest Interdisciplinary team could also discuss . . . to what extent it wanted to mimic reference conditions. Of course, a team could select the option of not manipulating habitats and allow natural processes to proceed "**

We will review the sections cited and try to make them easier to understand

1.162 **Figure 3-24 (DEIS page 3-109) shows the distribution of patch sizes. Is this the number of patches in each size category or the total acreage of the patches in each category?**

It is the number of patches in each size category expressed as a percent of the total number of patches That is why the Y axis is shown as a percentage We will clarify this for the Final EIS

1.163 **The acreage in large (greater than two thousand acres) forest patches may be significant even if the number of these patches is small. Thus, the EIS should show the acreage in each patch size category (DEIS page 3-109).**

This information comes from the paper by Erhard et al (1995) We will include this in the revision of the paper

1.164 **What constitutes a patch? A solid forest interrupted by a creek and associated riparian area may constitute forest fragmentation but not habitat fragmentation. In other words, the species using the forest will also use the riparian area Also, spruce-fir forests are frequently adjacent to and/or mixed with aspen. This again might be considered forest fragmentation but is likely not habitat fragmentation (RE: Erhard et al. (1995)).**

The spatial analysis process by Erhard et al describes on pages two through six how we used the Rocky Mountain Resource Information System (RMRIS) database to identify

patches Land Types are the basic unit spatially analyzed by DISPLAY and FRAGSTATS If two RMRIS sites are separated by a line drawn down the riparian area and both sites are the same Land Type, then the two sites are analyzed by the software as one patch -- not two, as suggested We disagree that a spruce/fir patch next to an aspen patch should not be viewed differently. They are different, and our spatial analysis recognizes this as landscape heterogeneity

1 165 **The patch study done by Erhard et al. (1995) fails to distinguish between natural fragmentation and human-caused, or induced, fragmentation. The later usually creates more stark contrast between the solid forests and the less or non-forested areas.**

We disagree A major focus of the Erhard et al approach was to develop reference conditions so that a comparison of natural landscape heterogeneity could be compared with human-induced landscape heterogeneity The spatial analysis does account for natural versus human-induced landscape heterogeneity at the model's scale of sensitivity This sensitivity is the threshold where Land Type changes Activities that do not change the Land Type will not show a change in the spatial analysis This does not mean that the analysis is invalid It simply means that we have to use a combination of tools to evaluate forest management practices This is why the DEIS spends considerable effort describing a Coarse- and Fine-filter approach to conserving biodiversity (DEIS pages 3-22 to 142) The spatial analysis approach by Erhard et al is part of our Coarse-filter approach to conserving biodiversity

1 166 **Patches in the Erhard et al. (1995) analysis are not defined by their boundaries with roads where patches abut roads Roads dissect patches and have a much larger and more permanent effect on their size than does the impact of the cut area itself (Reed et al. 1995). To adequately assess the impacts of roads, the Forest should analyze and compare the resulting patch maps with and without roads considered as boundaries to patches (Reed et al. 1995) This will require that the analysis of Erhard et al. be redone.**

We agree that roads are an important influence on spatial patterns The Rocky Mountain Resource Information System (RMRIS) database does not always reflect the patch being split by a road network from a timber sale We agree this is a concern However, we have no expedient way to capture this in our analysis if it is not reflected in RMRIS The approach by Erhard et al has a threshold of sensitivity The sensitivity is the point at which an activity causes a change in Land Type If the activity does create this change, then our analysis approach will not capture the change This does not mean that the analysis is invalid It simply means that we have to use a combination of tools to evaluate forest management practices This is why the DEIS spends considerable effort describing a Coarse- and Fine-filter approach to conserving biodiversity (DEIS pages 3-22 to 142) The spatial analysis approach by Erhard et al is part of our coarse-filter approach to conserving biodiversity

However, we concur that we need to address the road issue better in our fragmentation analysis in the DEIS We will revise this for the Final EIS Our intent here will be to show where the higher concentrations of road density occur on the RGNF

1.167 **The Erhard et al (1995) analysis included only two areas affected by management, and these two areas cover less than 10% of the forested area on the Forest. This is an inadequate sample, and does not provide the watershed-by-watershed assessment needed. These two sample areas were not chosen randomly, and thus represent a biased, inadequate sample of the Forest.**

We disagree and feel our intentions have been misunderstood The analysis was not intended to be a randomized sampling of the Forest We stated in the paper that the two landscapes selected for comparison with the reference were test areas The paper never said these two test landscapes were purported as the inclusive, representative landscapes for the rest of the Forest However, we do feel that the two test landscapes provide a good example of how to use the approach since the management options varied considerably between the two (see pages eight to ten in Erhard et al)

1.168 **The measures used in the Erhard et al. (1995) analysis are inadequate to assess the effects of fragmentation. The measures used are (a) the percentage of the landscape occupied by each Land Type, (b) the percentage of Land Type SF5 by patch size classes, and © the mean distance between patches of SF5 My comments are as follows:**

A) Measure (a) only partially addresses one of the four components of fragmentation, i.e., the actual area of timber harvest and roads (the other three components are dissection of patches by roads, edge created by timber harvest, and edge created by roads). None of the other three measures chosen address the other three components of fragmentation. Thus, fragmentation is significantly underestimated. Also, harvesting and roads affect more than just Land Type SF5.

B) One reason measure (b) appears similar between the reference and managed landscapes is because the Rocky Mountain Resource Information System (RMRIS) database is only updated for clearcuts/overstory removal cuts. Thus, most of the impact of timber harvesting in the Forest is not revealed Also, measure (b) is not very useful if restricted to Land Type SF5 since activities affect the other Land Types. Another problem with (b) is that it is displayed in Figure 2 of Erhard et al. as a frequency graph, rather than as a raw tally. We need to know that not only are the proportions the same in the reference and managed landscapes, but also that the actual number of patches is roughly the same.

***C) Measure © would be useful, but is incomplete as the results are barely* presented. We need to know what the value is for this index in the two test landscapes (Jarosa Mesa and Cross) The Forest should present a tally of the distribution of distances as was done for patch size in Figure 2. This distance analysis should also be done for the other Land Types (e.g , SF4, etc), as there is no reason that fragmentation is restricted to the SF5 Land Type. Distance also should be calculated from the edge of the patch to the edge of another patch, not from the center to center, as the location of the edge of the patch is what is most affected by harvesting.**

A) *We originally included an edge metric in our analysis but people thought it over-*complicated the analysis, so we removed it Based on the limited extent of the proposed timber harvest program for the next decade, this seemed reasonable However, we will incorporate an edge metric back into our analysis We will revise our analysis of road fragmentation for the Final EIS The Land Type distribution metric analyzes all ten Land Types -- not just SF5 as indicated in the comment

B) The RMRIS database is updated on the Forest after timber harvest, so your assumption is incorrect Metric (b) was restricted to Land Type SF5 because this is the Land Type most affected by timber harvest There is a myriad of Land Type combinations that we could analyze. We think a focus on Land Type SF5 for this metric gives us the most efficient use of our data, time, and people

The reason Figure 2 was shown as a frequency graph was because our comparisons between reference and test landscapes were analyzed with chi-square goodness-of-fit A raw tally would not make sense since the size of the test landscapes are unequal The chi-square expected frequency versus observed frequencies keeps units proportional

C) The Land Type SF5 patch distance measure was not intended to be a comparison The intended use of this metric was to provide a search radius between Land Type SF5 patches (see page eight of Erhard et al) Again, we focused on Land Type SF5 for the same reasons stated above FRAGSTATS makes the patch distance calculations and it is from a patch edge to a patch edge

1.169 **There appears to be significant errors in the comparison of patch size distributions between the managed landscapes and the reference landscapes. I obtained the raw output data from the DISPLAY analysis of the Cross landscape and the reference areas. These data, supplied by the Forest, do not support the results obtained by**

Erhard et al. as displayed in their Figure 2. These data also suggest that Figure 3-24 in the DEIS is not correct, and yet this is the basis in part for the Forest's argument that forest fragmentation is a relatively minor concern.

We did not directly provide you the raw data, so we are concerned that you did not get all the information that must accompany the raw patch data We reviewed the patch data very closely and the graphs presented in Figure 2 (Erhard et al 1995) and in Figure 3-24 (DEIS page 3-109) are correct A key piece of information that you may not have been aware of was we truncated the patch data for any patches found below 10 acres in size The reason we did this was because RMRIS originally set a polygon delineation minimum of 10 acres We found that when we converted the RMRIS polygon maps from vector (polygon based) data to raster (cell based) data, we picked up some very small patches, Since we could not always determine if a patch was an intentionally delineated patch below 10 acres, we truncated the data so that we would not overestimate the number of small patches

1.170 **The paper by Erhard et al (1995) fails to analyze the effects of roads, which are widely acknowledged among biologists to be one of the most serious causes of fragmentation.**

The paper and process we outlined never intended to directly cope with roads We realize that we need to review our discussion of road impacts in our fragmentation analysis in the DEIS We will revise this for the Final EIS Our intent will be to show where there are high concentrations of roads on the RGNF.

1 171 **How accurately do the 14 reference areas represent intensively managed areas? Erhard et al. (1995) state they are similar in slope, aspect, and elevation to Cross and Jarosa Mesa, but this information is insufficient to decide whether these are suitable controls. After a century of managing the Forest, why are these 14 areas undeveloped? Were they less desirable because of their inaccessibility, or because they have less timber volume, or both?**

The paper clearly describes the process used to aggregate sites into Landtype Associations (pages two to six in Erhard et al) The DEIS also explains how Landtype Associations were mapped across the entire Forest (DEIS pages 3-41 to 74) At the Landtype Association level (ECOMAP 1993), the areas mapped as Engelmann Spruce on Mountain Slopes Landtype Association (LTA1) share similar characteristics The reason the 14 reference areas exist after more than a century of accelerated human use of the Forest, is predominately tied to access The more accessible areas were the first areas harvested We had more potential reference areas to choose from (approximately 20-22 areas on the RGNF), but we reduced the list to the 14 areas we felt were the most comparable to the developed landscapes due to slope, aspect, and elevation range

1.172 **Pre-logging aerial photos of Cross and Jarosa Mesa should be used to assess the validity of the assumption that the reference areas represent Cross and Jarosa Mesa (RE: Erhard et al. (1995)). Data on timber volume, productivity, etc. should also be used to assess the validity of the assumption that the 14 reference areas represent other areas of the Forest that have been intensively managed.**

The Forest does not have a complete set of pre-1950 aerial photos from which to use That makes this kind of analysis very difficult We did spend time initially approaching spatial analysis by looking at aerial photos and trying to reconstruct conditions We found that we kept making so many assumptions that we could not make reliable conclusions

The paper by Erhard et al describes our process of using the existing Forest soil survey The survey was used to aggregate soil-mapping units with similar potential vegetation into thirteen Landtype Associations (ECOMAP 1993) The soil-mapping units, at the resolution of the Engelmann Spruce on Mountain Slopes Landtype Association (LTA1), share similar characteristics including timber volume and productivity

1.173 **The data for Jarosa Mesa were lost due to a hard drive crash (personal communication between Rosalind Yanishevsky and RGNF October 2, 1995). These data must be recreated to allow for proper analysis (RE· Erhard et al. (1995)).**

The analysis was complete for the intentions of comparing the test landscape (Jarosa Mesa) with our reference

1.174 **Erhard et al. (1995) and Carter (1995) must be submitted for impartial scientific peer review. The RGNF relies heavily on both papers for evaluating the effects of logging and for setting management policy However, neither document has had the scrutiny of peer review that occurs when a paper is submitted for publication in a scientific journal. Until this is done, these documents should not be used to set management policy. *Choosing one's own peer reviewers is unacceptable for many reasons; e.g.,* it is not impartial and there is no accountability.**

The Carter paper has been submitted for publication The paper by Erhard et al has undergone abundant critical review The concepts have been presented to the Regional Forester and Directors in the Regional Office It has been presented to the Washington Office Ecosystem Management Staff and the Regional Office Planning Staff It has also been formally presented to the Analysis in Support of Ecosystem Management Workshop held April 10-13, 1995 in Fort Collins, Colorado The proceedings of this workshop were published as Thompson (1995) The paper was formally presented to the Society for Conservation Biology Conference held June 7-11, 1995 in Fort Collins, Colorado The paper has been reviewed by Dr Curtis Flather, Dr John McTague, Dr William Baker, Dr. Rosalind Yanishevsky, and many members of the public All the comments are being evaluated and a revision of the paper will be the result We think we have been very accountable A Forest Plan revision receives intense public scrutiny In today's society, very little Forest Service land management policy is carried out without thorough public overview

1.175 **I note that Mehl (1992) omitted canopy closure as a requirement for any old-growth *cover type (canopy closure was considered a nonessential attribute for only aspen* and pinyon-juniper). Yet the RGNF uses canopy closure in its structural stage classifications as the primary means of determining its "best approximation" of old-growth stands (DEIS page 3-44).**

Without a Forestwide inventory by the Mehl descriptions, we have to rely on the best information we have We are using the existing database information and making the best interpretation we can in the Draft Plan We still feel, based on the accuracy of the data, that Habitat Structural Stages 4B, 4C, and 5 (Structure Class 5) are the best approximation of old growth on the RGNF We do not have another attribute in our database that gives us a comprehensive overview on how much older forests we have We are revising our old growth Standards and Guidelines to address old growth inventory over the life of the Plan better

1.176 **To identify the Forest's spruce/fir old growth, I suggest that a comparison be made between stands where (1) the diameter of trees in the >9" d.b.h. size class =>16" d.b.h. (these data should be readily available in the Rocky Mountain Resource Information System (RMRIS) database), and stands where (2) there are 10 trees/acre =>16" d.b.h (Mehl's criteria). Stands that meet (1) generally would have more large diameter trees and probably a greater Coefficient of Variation, which should help distinguish old-growth habitats from mature forests.**

This approach only measures one of Mehl's attributes This would be another approximation of the Forest's old growth

1.177 **At best, the RGNF is identifying only early old-growth habitats. My analysis and observations indicate that much of what the RGNF classified as late-successional forest is not old-growth habitat, and few true (McClelland 1985) old-growth stands exist on the RGNF. By lumping the few true old-growth habitat stands into the amorphous "Structure Class 5" with mature stands and marginal old growth, they are at high risk of being logged.**

The Regional Forester, in a 2410 letter dated September 28, 1992, declared the Mehl (1992) descriptions as the characteristics believed to represent old growth conditions in the Rocky Mountain Region These are the descriptions we are using when we refer to "old growth " Since a large portion of the Forest remains undeveloped under each Alternative, then there is a large amount of late-successional forests that remain unaltered and allowed to proceed under natural processes Your statement makes the assumption that the proposed cutting in the next ten-year period would cut all the remaining highest "quality" old growth If no one knows where this is, how could we target its demise? The old growth Standards and Guidelines are being revised to better articulate retaining old growth stands that exhibit characteristics that exceed Mehl's attributes

1 178 **Mehl's (1992) criteria will be applied before a timber sale (Draft Plan page III-6). However, the DEIS does not state how many stands will be ground verified. These criteria were published in 1992; yet, incredulously, more than three years later only seven stands have been ground-truthed on the RGNF (personal communication between Rosalind Yanishevsky and RGNF October 2, 1995).**

We are revising our old growth Standards and Guidelines to address old growth inventory over the life of the Plan better

1.179 **The Draft Plan on page III-6 provides guidelines for prioritizing retention of old growth, but these are vague statements, and as Guidelines, they are not required. Furthermore, the RGNF staff suggested that "higher quality" old growth is only a "value judgement," rather than of biological significance (personal communication between Rosalind Yanishevsky and RGNF October 2, 1995).**

The old growth Standards and Guidelines are being revised for the Final Plan. Guidelines are more precisely characterized as preferred courses of action designed to promote achievement of the goals and objectives in the Plan. When deviation from a Guideline is necessary, it is documented during the project-level analysis This means that the rationale for deviation is subject to public purview.

We have been misunderstood We still believe that "higher quality" old growth is a value judgement depending on the individual's perspective Some people view this as greater or fewer structural elements (e g , down woody material) to favor a particular species of wildlife Others view it as large trees without a large concern for an age criterion Quality and the biological significance are dependent upon the ecological characteristics that make a stand old for the site and for the tree species

1.180 **The DEIS on page 3-44 states that Structure Class 5 is an approximation of old growth on the Forest as defined by Mehl (1992). The DEIS should disclose the parameters of this "approximation." In reality, old growth will be a lot less abundant than Structural Stage 5 (personal communication between Rosalind Yanishevsky and District Biologist, Conejos Peak Ranger District, no date).**

Both Structure Class and Structural Stage 5 were mentioned in your comment These have different meanings Structure Class 5 criteria are clearly displayed in the DEIS on page 3-44 We have no question that the Mehl old growth on the Forest will ultimately be different than the Forest's estimate of late-successional forest However, we do not know how much different

1.181 **The Regional Forester has directed Rocky Mountain Forests to use only Mehl's (1992) criteria to describe old-growth habitats (Estill 1992). The RGNF has used only Structure Class designations in its forest planning process; therefore, has not addressed the effect of the proposed revised Draft Plan on old-growth habitats.**

The Regional Forester, in a 2410 letter dated September 28, 1992, declared the Mehl (1992) descriptions as the characteristics believed to represent old growth conditions in the Rocky Mountain Region The intent of her letter was to define what the Region is calling "old growth " The purpose of this was to have common understanding within the Forest Service and among the public of what the Region is calling "old growth " The DEIS was clear in stating the following "The Forest does not have an inventory of old-

growth according to Mehl's criteria However, the Forest does have an estimate of the amount of late-successional forest" (DEIS page 3-136) We have been honest in saying we do not know how much Mehl old growth is on the Forest However, we made the best estimate we could of older forests on the RGNF with our existing data

1.182 **The RGNF staff maintains that bigger, higher quality trees were not cut first and therefore historically there were not more big trees than currently exist today *(personal communication between Rosalind Yanishevsky and RGNF October 2, 1995).* Given the management history before and after designation of the RGNF (Appendix A, pages A-19 to 24), this assertion is not logical An estimate of the amount of historical old growth could have been made (see, e.g., Lesica 1992, Van Wagner 1978); however, this was not done**

That is not what we said We said that the readily accessible areas on the RGNF were undoubtedly the first areas to receive some type of timber harvest treatment When one acknowledges how much of the Forest has been harvested (see DEIS pages 3-147 to 170), it is illogical to say that the Forest has cut all the bigger, higher quality trees In selected areas, this is probably true, but over the entire Forest this is not true We do not see anything in Appendix A, pages A-19 to 24 that supports your conclusion There are records of early, heavy cutting predominately in the Montane Zone, with selective heavy cutting in the Forest's massive Subalpine Zone

It is doubtful that there is sufficient historical data to portray the amount of old growth accurately that existed during pre-settlement Appendix A, page A-23 states that there are not enough historical data from which to make detailed conclusions about the RGNF's forested community composition and structure

The Rocky Mountain Forest and Range Experiment Station library was unable to locate the reference by Lesica (1992) However, we did locate Van Wagner (1978) This paper discusses an approach to estimating the fire cycle by looking at the distribution of present stand ages However, old growth (Mehl 1992) is described by more attributes than age. Therefore, it is not clear how this paper would allow us to make a better estimate of the Forest's historical old growth

1.183 ***The DEIS on page 3-136 states that pre-settlement conditions cannot be achieved in* any event, because of the increase in carbon dioxide and atmospheric pollutants means that there are no unimpacted old-growth stands. This should have been part of the cumulative effects analysis on old-growth forests Because these environmental factors are likely to ultimately cause a decline in vigor, and possibly viability, a greater amount of old-growth habitats should be retained.**

We will add a statement to the Old-growth Forests Cumulative Effects section that reiterates the change in atmospheric pollutants, due to the Industrial Revolution

A large amount of late-successional forest is perpetuated in each Alternative (see DEIS page 3-136, Table 3-34 and compare with page 3-139, Table 3-36) Also, the analysis process outlined by Erhard et al (1995), and shown as a Guideline for Management-area Prescriptions 5 11 and 5 13, addresses spatial configuration and amount of late-successional forest based on reference conditions

1.184 ***The RGNF should determine the quality, quantity, and distribution by ground* verification of the remaining old-growth and mature ponderosa pine stands. Because these stands are believed to be rare on the RGNF, and elsewhere in Colorado, old-growth and mature ponderosa pine habitats should not be cut until an inventory and analysis is completed.**

Under Full and Experienced budgets, there is no harvest slated for ponderosa pine cover type (see DEIS page 3-162, Table 3-39, Note at bottom of the table) We are revising our old growth Standards and Guidelines to address old growth inventory over the life of the Plan better

1.185 **What forms will be used in the future to evaluate old-growth stands? This should be presented in the DEIS to allow opportunity for review and comment**

The protocol and form will need to be developed by our Regional Office so that all the Forests in the Region are consistent in their approach to old growth inventory We will express this concern to our Regional Office Until an acceptable Regional protocol is developed, the Forest will use and interpret the Mehl (1992) descriptions to the best of its ability

1.186 **Do not cut any stands that meet the Mehl (1992) criteria Large blocks of late-successional forests are relatively rare and should not be cut. Do not disrupt connectivity between stands that meet either of the first two criteria I just mentioned.**

We disagree A large amount of late-successional forest is perpetuated in each Alternative (see DEIS page 3-136, Table 3-34 and compare with page 3-139, Table 3-36) Also, the analysis process outlined by Erhard et al (1995), and shown as a Guideline for Management-area Prescriptions 5 11 and 5 13, addresses spatial configuration and amount of late-successional forest based on reference conditions We are also revising the old growth Standards and Guidelines to give better direction for retaining old-growth stands

1.187 **You should require retention of 10% of the highest quality old-growth habitat available, plus 5% replacement old-growth per 10,000 acre analysis area. This figure is based on the large amount of late-successional forest on the RGNF, the RGNF fire regime and standards on many other national forests (Yanishevsky et al. 1994). Requiring a standard for old-growth retention is in addition to, not a substitute for, retaining the amount, patch size and distribution of late-successional forests representative of the unaltered landscape.**

We disagree with applying uniform percentages to all ecosystems

2. Air Resources

2 1 **Enhanced atmospheric enrichment of inorganic nitrogen is fertilizing the Forest and contributing to higher-than-historic fire potential.**

No references were provided to substantiate this claim Nothing from Forest management is known to contribute to inorganic-nitrogen enrichment There are no legal requirements to discuss this during alternative analysis This may be a good topic to discuss as outside the scope of the Forest Plan

2.2 **Preparation and operation of ski slopes can result in air pollution**

No adverse effects on air quality from ski area operation are known to exist (page 3-144, DEIS) Minor effects exist at all recreation sites (page 3-145, DEIS)

2 3 **Snowmobile and ORV use have negative impacts on air quality.**

Effects of motorized uses and recreation are discussed on page 3-145 of the FEIS

2.4 **Class I airsheds should be protected.**

Please see page 3-145 of the DEIS

2.5 **Balancing age-class distribution of trees across the Forest will help minimize contributions to global warming.**

Global warming was considered an issue beyond the scope of the Forest Plan

3. Timber Resources

3 1.1 ***Why isn't the RGNF dealing with forested areas under attack from insects and disease* (e.g., mixed conifer between South Fork and Creede)? If the RGNF does not actively cut to reduce impacts from insects and disease, then the Forest could be facing severe forest health conditions like that found in other parts of the West (e.g., eastern Oregon).**

The Forest is aware of infestations of insects and disease and tries to reduce or minimize the damage to living trees when possible Some recent timber sales have been/are being undertaken to deal specifically with infested areas Other areas are being monitored, such as the mixed conifer stands between South Fork and Creede Other areas of the West having severe forest health conditions, like the Blue Mountains in eastern Oregon, are lower elevation forests dominated by Douglas-fir, a prime host for the western spruce budworm The RGNF is dominated by spruce/fir forests where defoliators are not as prevalent, hence, the severity of attack is not as great Reasons for not cutting may be 1) slopes too steep for conventional harvesting, 2) there is no, or inadequate, access to infested areas, 3) costs for managing are too high and/or needed funds are tied up elsewhere, 4) much of the affected timber is small in size and/or unmerchantable, or 5) the effects of cutting, skidding, and decking of logs, plus the effects of constructing access roads, may be more detrimental than allowing infestations to peak and decline and then let the area recover

Additionally, there are many people who oppose intervening with natural processes like insect and disease infestations The Forest tries to balance management between the *polarized views of a) respond aggressively to insect and disease damage to b) do not* interfere with natural processes

3.1.2 **The Forest should analyze another alternative that represents the forest health issue *and " would establish the 'desired future condition' for forest health.."***

All alternatives reflect the Forest Health issue Insect and Disease infestations will occur regardless of the alternative

The RGNF is dominated by the spruce/fir cover type where forest health conditions are well within the range of natural variability It is in the Douglas-fir/mixed conifer and ponderosa pine cover types where forest health is most in question Many of the stands in these cover types, that are in areas that can be conventionally harvested, have been entered for harvest in the past Most other Douglas-fir/mixed conifer and ponderosa pine stands have not been entered because it is uneconomical to do so, because of steep slopes, high costs for access (road construction), unmerchantable material or non-marketable small material, or due to a scattered pattern of stands (i e , great distances between stands)

With declining budgets and a continuing emphasis on above-cost sales, suitable lands will continue to fall in the spruce/fir cover type where road systems are already established

Proactive management responding to forest health concerns must also address the effects and management of grazing and fire suppression

3.1 3 **The damage to forested stands in the Crystal Lakes area was due to timber cutting, not the spruce beetle epidemic. "Shelterwood cutting removed too much timber in *the first entry, causing extensive blowdown, in which the bark beetles bred and* spread to live trees, which were then clearcut."**

The discussion of effects from a spruce beetle epidemic in the Crystal Lakes area has been *edited to more accurately reveal effects from both the beetles and the subsequent salvage* operations

The shelterwood first entry, near Crystal Lakes, where the blowdown later occurred was of standard design and did not remove "too much" timber Shelterwood first entry cuts have been implemented throughout the Forest with little or no blowdown occurring The

blowdown area covered about eight to ten acres, not an "extensive" area nor highly unusual (In 1990, 27 acres of spruce/fir were blown down in and near the La Manga Timber Sale The bulk of the blowdown was outside of the harvested area, a first-entry shelterwood There have been additional blowdowns in Rock Creek and Saguache Park in areas not previously harvested)

The dead and dying timber in and around Crystal Lakes was salvaged Where possible, smaller trees not attacked by the spruce beetle were retained, hence, the area was not clearcut (There are some older clearcuts in the vicinity of Crystal Lakes that were not a part of the spruce beetle salvage cuts)

3.2.1 **Timber sales are often visually degrading and their effects can be adverse in special areas, such as near wilderness. Control of harvest operations has been poor. If timber sales are needed, they should be designed to cause minimal impact on the forest.**

Adjacency to wilderness or other special areas would be a key analysis issue for any proposed harvest close to such areas With proposed harvesting, under the preferred alternative, affecting less than one percent of the forest (with expected budget levels, two percent if fully funded) for the ten-year period of the plan, harvest impacts near wilderness/special areas are projected to be minimal

Logging can appear very disruptive to the human eye Timber sales in the past were often designed and administered with less knowledge, and concern for resources such as the scenic resource All timber sales proposed during this plan will adhere to Scenic and other resource constraints Improved sale design/administration coupled with protective standards and guidelines are expected to ensure the protection of Forest resources

The logging technology used on a sale will influence the degree of disturbance Most harvesting that occurs on the RGNF is by ground-based mechanical means Logging with horses, or with systems where logs are moved suspended off the ground (cable, balloon, or helicopter) usually result in less disturbance to understory vegetation and the ground surface -- but are generally cost prohibitive on the RGNF.

The Forest encourages the public to visit timber sale areas after timber sales are terminated, disturbed soils are seeded, and slash has been compressed from winter snows Understory vegetation recovery in harvested areas can be dramatic after just a few years.

3.2 2 **the checking of forest products (e.g., firewood) permits is inconsistent and people have been observed gathering products without permits. As timber becomes more scarce and the cost of wood products increases, more illegal cutting will occur.**

The RGNF attempts to enforce all enforcing wood products permits As a result of funding and staffing cuts, the presence of Forest personnel in the field has been reduced Timber theft may increase as greater demand and decreasing supply put greater pressures on wood product resources

3.2 3 **People questioned timber management direction on the RGNF, and within the Forest Service in general, ranging from a) forest resources are, and need, to be used and managed, to b) forest resources should be protected from human impacts so as to ensure ecological integrity. Utilitarian-minded respondents felt that the preferred alternative would lead to mature forests burning up or killed by insects and disease; while preservationists saw the preferred alternative emphasizing timber resources over non-extractive resources and resulting in loss of connectivity, fragmentation of the forest environment, destruction of resources and loss of biodiversity. Some felt that timber production should never be a goal in of itself (as in MA 5.13).**

The RGNF manages forest resources to meet human needs and to comply with legal mandates, including laws that direct the Forest Service to a) manage to produce timber products (Organic Administration Act, Sustained Yield Management Act, Multiple Use-Sustained Yield Act), and laws that mandate protection of resources (Organic Administration Act, Sustained Yield Management Act, Clean Water Act, Multiple

Use-Sustained Yield Act, National Environmental Policy Act, Endangered Species Act, North American Wetlands Conservation Act)

During times of nationwide economic expansion, such as post-World War II into the 1960's, timber management received a major share of available funding for Forest Service operations, while other resources received less emphasis. But as all forest resources are being impacted by greater use, and recognized as equally important and interconnected, the Forest Service has shifted funding to reflect a more balanced approach to meeting these goals

Timber management remains a viable part of the mission of the Forest Service -- as does the protection of all resources and includes biological diversity The Forest feels that the preferred alternative has integrated good scientific information with a balance of resource allocation to meet these diverse goals, with a result that will provide for a sustainable flow of forest products, promote a healthy and productive forest environment, and ensure protection of resources while sustaining biological diversity

3.2 4 Respondents questioned whether the RGNF regarded local sawmills as important to the management of the Forest and the economy of the area.

The RGNF views the work of all local sawmills as being assets to the local and regional economy, and as assets in implementing management on the Forest

3.2.5 The Forest should be selective as to which trees are to be cut.

The RGNF specifically chooses trees that are cut, beginning with the reconnaissance of areas for potential sales, the analysis of timber stands to be cut, the development of silvicultural prescriptions that respond to management objectives, the individual marking of trees for harvest (or for reserve), and ending with the administration of the timber sale contract

3.2.6 Unprocessed timber products (i.e., sawlogs) should not be exported out of the country, or even out of the region

The exportation of raw logs out of the region cannot occur without advance approval (and is rarely done) Federal law prohibits the exportation of timber, cut on Forest Service lands, out of the country

3.2.7 People commented on poor logging practices of commercial loggers, and how the DEIS represented their past work as irresponsible. Also, some commentors felt that the large companies were less concerned about post-timber sale conditions than small logging companies; therefore, sales should be designed to favor the smaller companies. Suggested changes would be to provide for "a more realistic timetable for smaller operators", to modify the small business set-aside program, and to allow for stewardship contracts.

There was no intent to reflect mining and timber interests as being irresponsible The historical background of use on the Forest was displayed merely to show the effects of past practices In most RGNF timber sale areas, it is the Forest Service, not the loggers, that are chiefly responsible for post-harvest conditions Sale planning, design and on-the-ground preparation guide the eventual sale administration and actual harvesting If pre-sale work is effectively accomplished, it makes it much easier for loggers to do a quality job

The quality of logging on a sale cannot be characterized by the size of the logging company or firm There are conscientious, efficient woods operations that have few employees, and some that have many employees, just as there are operations, large and small, that are poorly run and require close, constant administration

Timber sale contract time frames (length of contract) are selected based on sale volume and amount of road construction while assuming a performance capability that reflects relatively efficient logging operations These time frames are realistic and allow for some

flexibility due to adverse logging conditions (such as abnormally wet weather) Extending contract term periods can have positive or negative benefits Extended periods lengthen the time during which logging disturbance can adversely affect physical and biological resources -- and can favor the inefficient harvest operation Conversely, longer contract periods may be appropriate where shorter active harvesting "windows" are desired to reduce impacts on wildlife species

The RGNF tries to set up small sales to be responsive to smaller operators, and meets requirements for Small Business Administration Set-Aside Sales (where small businesses have exclusive rights to initial bidding on timber sales) Altering those requirements would be inconsistent with adjoining forests and service-wide policies, would require Washington office approval, and would require changes throughout the Intermountain Appraisal Zone (which includes both the Rocky Mountain and Intermountain Regions) Stewardship contracts also require Washington office approval

3.2 8 The Forest did not analyze, and display effects, for a reasonable range of alternatives, nor did it select an alternative that reflected an optimal balance between all resources; nor did it propose any alternatives that would increase the timber supply.

The alternatives were developed based on a range of issues and concerns expressed by the public, not by a set of pre-determined outputs We feel that the range is adequate That range reflected public input from numerous public or work group meetings that included review of the preliminary alternatives before they were finalized for analysis

The range of alternatives included anywhere between 0 and 85% of the tentatively suitable timberlands Any of the alternatives could have increased timber based on emphasis but did not Optimum balance is subjective we feel that there was an optimal mix between resources in each alternative, again depending on the emphasis of the alternative

As part of the final EIS, Forest staff have run and displayed a benchmark which represents maximum sustainable volume over the total tentatively suitable timberlands This information will allow comparisons to be made between the benchmark level and alternatives' levels of outputs

3.2.9 Though the Forest emphasized the amount of harvesting that will occur under experienced budget levels, with the recent political shift in Congress, harvest levels are likely to be closer to the full budget level.

The DEIS and FEIS display timber harvest levels for both the experienced and full budget levels and analyzed the affects of each The experienced budget level is a much more realistic view of expected outputs than the full budget level, as it reflects actual funding directed per resource in recent years Congressional funding allocations shift year-to-year and, certainly, there could be a shift over the next 2, 5, or 10 years that allocates more dollars to timber management -- or vice versa Also, the experienced budget level does not reflect planned additional reductions in Forest Service funding of 8% per year for fiscal years '97-99 -- which is likely to reduce dollar allocations to timber management even further

3.2.10 Is the Forest assuming that pinon/juniper communities are dominated by older trees?

Regarding pinon/juniper communities, there appears to be larger areas of older trees on the Forest than may have occurred prior to the arrival of European people This is true for other forest cover types on the RGNF

3.2.11 How can the Forest equate harvesting with natural disturbances when research has pointed out differences in effects between the two?

The Forest does not assume that harvest practices will equate to natural disturbances But the Forest will attempt to simulate such disturbances (in terms of size and shape) as much

as possible Harvesting can simulate certain aspects of disturbances, such as extent of area affected or resulting species composition Partial cutting removes mostly smaller diameter merchantable trees, much as a fire kills usually thinner-bark trees, and thereby having similar effects on removing competition But we fully realize that many ecological functions arising from, or interacting with, fire, or insects and disease, cannot be duplicated by harvesting

3.2.12 **A commentor felt that the Forest's stated intent to intensively manage some cover types (particularly the pine types), in Category 5 management areas, to restore them to a range of natural variability, was "A prescription to do an awful lot of silvicultural damage".**

We disagree with the commentor's perception.

3.2.13 **Commentors said that the Forest Service "needs" to open up forested stands to maintain forest health and reduce the risk of loss due to fire and insects and disease. People also felt that wildlife, which need openings or "edge" for habitat, were at risk unless more active harvesting is done.**

Disturbance of the forest environment is inevitable, and forest environments adapted to disturbance events over thousands of years, long before forests were harvested as we harvest them today Timber that is reaching latter stages of life, or dying due to old age or pathogens, may seem wasteful in people's eyes but is extremely important from a biological diversity standpoint, both in providing structural elements for animals and plants (e g , snags for perching and cavity-nesting birds) and in providing a source for nutrient recycling to maintain long-term soil productivity Timber harvesting can enhance, or harm, biodiversity depending on ecological conditions prior to cutting and how the cutting is applied Harvesting often serves objectives for improving tree health Complexity arises when trying to use harvesting to improve ecosystem health Harvesting can be used to improve ecosystem health, but the complexity of ecosystem processes may favor an approach that allows natural processes to take place without human intervention As the scale of ecosystem disturbance increases, the evaluation of people's role in affecting those processes becomes increasingly important The RGNF is constantly interacting with the public, sharing information on both positive and negative effects of timber management If disturbance events occur on the RGNF in the future, and a value is seen in harvesting affected timber, salvaging can occur to meet those objectives

3.2.14 ***A suggested Silviculture guideline was to "avoid harvesting in adjacent watersheds at the same time".***

The juxtaposition of discrete harvest activities occurring simultaneously is a consideration analyzed during the planning of projects If proposed activities are perceived to, cumulatively, adversely affect other resources due to proximity, then some activities will be delayed But if management activities are to mimic natural disturbances, at least in magnitude, silvicultural treatments could occur in adjacent watersheds -- because large natural disturbances have affected adjacent watersheds in the past In reality, most timber sales on the RGNF are small relative to the watersheds they fall in, and within all timber sales, harvest operations move across these areas instead of affecting the entire area at once For these reasons, the Forest feels that such a guideline is unnecessary

3.2.15 **Several commentors preferred "small"/"smaller" timber sales. "There is no future in large timber cuts." Other commentors expressed they were against below-cost sales, or that timber sales should be designed to make the most money.**

The characterization of "small" versus "large" sales varies from person to person From fiscal years '93-95, the Forest sold 19 sales that ranged in value from $2001 to 2,000 MBF, two sales that ranged from 2,001-5,000 MBF, and one sale of over 5,000 MBF Timber sale size (or area) varies due to a number of factors, including condition of stand(s), biological concerns, visuals, timber stand area, volume per acre, existing/potential transportation system, economics, etc The Forest Service tries to select an appropriate sale size that reflects a consideration of all issues and factors Due to the demand from the public to heighten efficiency and to avoid below-cost sales, timber sales are designed to treat an

area as efficiently as possible -- which generally equates to treating an area with one large sale instead of two or more small sales and resulting in more dollars returned to the US Treasury. As a result of cost-cutting measures, the RGNF is one of only two forests in the Rocky Mountain Region to have an above-cost sale program over the last 3 years, and continues to strive to reduce costs.

3.2.16 The RGNF claimed that an aspen clearcut near Bonanza would regrow into thicker forest than before; but "all we got was a whole bunch of stumps".

This particular area was cut to promote regrowth for wildlife and to provide fuelwood for nearby residents. Regeneration failure may have been due to a combination of too many elk eating the sprouts on a drier-than-normal aspen site. There are indications that aspen management on too small a scale acts as a magnet in attracting elk and livestock that prefer aspen shoots for feed.

3.2.17 A commentor felt that the Forest probably spends more money in "policing" of forest products than if the RGNF would just let people "go up and get it".

We are uncertain as to whether you're talking about people getting firewood or whether you would like the Forest to set up more sawtimber sales. There are a number of regulations governing the sale and use of wood products that come from National Forest lands. These regulations were put in place to protect the diverse interests of the American public and these valuable resources.

3.2.18 Folks commented on the risk to old-growth stands due to logging, partly due to fact that loggers prefer to cut old growth over younger stands.

Actually, old-growth stands are generally not preferred for logging as compared to mature stands. For example, in the Forest's dominant cover type, spruce/fir, stands meeting Mehl's criteria for old growth include many overstory trees that reflect advanced stages of decay. Hence, there are greater risks to loggers' safety because of unstable branches, tops, even whole trees. As these trees are felled, there is more breakage due to interior defect, resulting in losses of volume to the logger. More time is spent by the sawyer separating ("cutting out") sound wood from cull (nonuseable) wood. Skidding operations can be hampered by the greater amounts of dead downed wood that restrict movement of machinery, along with the need to avoid damaging existing seedlings, saplings, and poletimber (which are generally more abundant in old growth than mature stands). Even volumes per acre can be less (though not always the case) in old-growth stands as compared to mature stands because there can be greater numbers of stems in the smaller, unmerchantable diameter classes with progressively less stems in the larger diameter classes. This is especially true in stands reflecting uneven-aged diameter distributions. In contrast, mature spruce/fir stands that haven't reached the point in successional progression where the overstory begins breaking up and creating holes in the canopy are preferred because logging safety and efficiency are optimized and less cull wood is contained within the logs that are hauled to the mills.

3.2.19 Will the Forest manage future forest stands for lumber or pulp?

Future forests will be managed for a variety of forest products. Most of the wood product outputs assume production of sawtimber for lumber.

3.2.20 Suggestions were made, regarding harvest practices, to provide more protection to special areas (e.g., TES species habitat, Native American ceremonial areas, scenic viewsheds) and to blend harvested areas into the surrounding landscape.

The availability for use of varying harvest treatments coupled with adopted standards and guidelines will protect these special areas and provide protection to, and around, openings created by harvesting. Implementing silviculture guideline #11 will serve to shape harvest treatments so as to conform to the landscape. In addition, the environmental analyses conducted during project planning normally consider protection of special areas and design means to protect these areas.

3.2.21 The resource inventory, on which the RGNF is basing its timber management and its assessment of cumulative effects, is inadequate. How can the Forest select a preferred alternative with the Forest's current lack of information.

The Planning regulations state that the Forest must use the "best available information The Forest feels that the RMRIS database contains the most accurate, up-to-date information for displaying current conditions relative to potential timber harvest (and cumulative) effects, especially in light of the extremely limited area of the RGNF that is expected to be affected by harvesting in the next 10 years Additionally, the database is becoming more accurate as the Forest utilizes technologically advanced measuring equipment (e g , GPS, lasers)

The Forest is legally obligated under NFMA, and Judge Finesilver's decision, to analyze and select a preferred alternative. The preferred alternative incorporates forestwide vegetation and soil inventories and the most current versions of accepted growth and yield models to determine sustainable volumes for the planning period

3.2.22 Concerns were voiced over the standard that prohibits harvesting within 600 feet of timberline. Recommendations varied from a) changing the standard to 500 or 600 vertical feet (instead of slope distance) to avoid regeneration problems, to b) dropping the standard altogether because of subjectivity in determining where timberline actually falls and because it would "promote more continuous forest cover over the long term rather than have wide variations occur "

The Forest, in cooperation with the Colorado Division of Wildlife, has utilized a 600-foot slope distance buffer for several years and together feel that it is adequate and necessary to prevent regeneration problems and provide protection for wildlife Timberline is determined by looking at the average for an area, on similar aspects The standard was modified to read " harvested within APPROXIMATELY [emphasis added] 600 feet " since it is an estimate as to where timberline actually begins Natural disturbance would be expected to continue to cause fluctuations in forest cover

3.2.23 Standards and guidelines for lands selected for harvest of forest products are not quantitative, and could be interpreted to be so limiting as to preclude harvesting

Just as the Standards and Guidelines could be limiting, they also could allow for broadscale harvesting With harvest activities tying closely to reference conditions, the Forest can more effectively emulate levels of disturbance, especially magnitude This flexibility will enhance adaptive management as new information relative to ecological condition becomes known

3 2.24 It is difficult to determine the differences between alternatives D and E as described in Chapter 2 of the DEIS. For example, with alternative D's Timber Management and Suitability description identical to alternative E "except that D includes 'Management would be designed to simulate natural disturbances to the landscape ' Does this mean that E will not have this as part of the timber management?"

The statement, incorrectly omitted from the description of Alternative E in the DEIS, has been added in the FEIS

3.2.25 *Some people felt that roads are being constructed to access timber sales that are* "banked, 25-foot-wide, 50 mph highways".

For about the last 6 years, the RGNF has been incorporating minimum standards of road construction/reconstruction in timber sale roads, such as native soil surface (i e , no gravel), no ditching, rolling water dips (in place of culverts), minimum widths, minimum lengths (hence, long skid trails). There are "costs" for meeting minimum standards -- more skid trail impacts, shorter effective hauling seasons and firewood gathering periods (native surfacing roads cannot withstand hauling when muddy) The Forest is trying to concentrate its intensive timber management in the already roaded base, hence, road systems, even skid trail networks, will be used again in the future Adverse impacts might be greater on soil and water resources if these road systems are cut on the landscape,

reclaimed, and cut again in the future with future harvest entries The Forest is making a concerted effort both in reducing costs of constructing and maintaining roads and in reducing impacts on the ground.

3.2.25 One commentor continued to attribute problems with harvesting on the RGNF to the Louisiana Pacific Timber Company.

Louisiana Pacific does not own a mill in, or near, the San Luis Valley The nearest LP mill is in Olathe, Colorado

3 2.26 Commentors felt that sawtimber purchasers should bear more, or all, of the cost (road construction, slash disposal, erosion control) of some timber sales on the RGNF.

Roads constructed to access timber provide access for other resources For instance, roads built to access timber may be used for numerous other purposes Most roads on the RGNF, that provide access for recreationists, firewood cutters, hunters, etc , were initially constructed to access timber Also, other activities, that occur in conjunction with timber sales, often meet objectives tied to resources other than timber For example, the sale of timber off National Forest lands can generate revenues that are invested back into resources where the sale occurred, such as in creating cavities for cavity-nesting birds or improving other facets of wildlife habitat.

3.2.27 "Do not give primary emphasis to the revenue generating timber harvesting by any logging company.."

The preferred alternative reflects a balance of allocation of resources Management areas 5 11 (General Forest and Rangelands) and 5 13 (Forest Products) contain suitable lands that are most appropriate, on the RGNF, for providing wood products if protection of soil and water resources and biological diversity can be assured Hence, wood products are still an objective if ecological integrity can be protected Other suitable lands can also provide wood products as long as the resource emphasis, particular to that management area, is assured, and basic essential resources are protected

3.2 28 Commentors expressed that many old logging roads should be closed; and that all roads constructed to access timber should be closed immediately after harvesting.

Many old logging spur roads have been closed in the past In addition, it has been Forest policy since the early 1990's to close roads constructed for timber sales immediately after 1) sale termination date, or 2) a period allowing public access for firewood New roads may be constructed, and left open, to replace roads created in the past that were poorly designed or created from repeated use by hunters, campers, and other forest users Adopted standards and guidelines that provide protection for soil and water resources will ensure that new roads are constructed in an environmentally safe manner

3.2 29 "Please revise the preferred alternative to intensify management of your forest unit.." to avoid exporting ecological and economic problems elsewhere

The RGNF staff is aware that decisions made as part of the revised FP have repercussions outside of the San Luis Valley and surrounding area Such decisions were made in the context of a conservative approach that assures protection for soil and water resources and for biological sustainability, with subsequent opportunities for utilizing forest resources

3 2.30 The descriptions of the alternatives are inconsistent with respect to road construction into unroaded areas.

Alternatives B and D should have been similarly described If unroaded areas are included for harvest in any alternative then roads will be constructed to provide access

3.2 31 Within the description for MA 5.11 and 5.13, reference is made to MA 3.5 and 3.3.

Thanks for finding our mistakes, which have been corrected in the Final FP

3.2.32 Whole tree harvesting should not be allowed on the Forest since most suitable lands are rated severe for long-term soil productivity.

The effects of soil nutrient loss, in whole-tree harvested stands, can be mitigated by redistributing fine slash back over the harvested area Soils Standard #1 will ensure that nutrients are retained in harvested stands

3 2.33 The Copper Mountain harvested area is " .in terrible shape and needs to be restored. The roads need to be obliterated."

This area has been impacted by past clearcutting and overstory removals, at a time when dense road systems were the norm Though the Forest prefers to keep this area in the suitable land base (it is a productive timber site with an existing road system), the area is not planned for harvest in the foreseeable future, thereby allowing restoration to occur through time outside of open roads

3.2.34 "..the Forest has ..seemed to make the assumption that a timber program and recreation program are mutually exclusive.."

The Forest believes that some aspects of timber management conflict with some aspects of recreation (e g , clearcutting in visually sensitive areas), and that some aspects of timber management can serve to enhance recreation (e g , partial cutting/thinning of dense stands in and around backcountry ski areas)

3 2 35 Updating of timber inventory and management activities, such as harvesting, should be done before using the spatial analysis model. This requirement should be added as a standard or guideline.

The Forest tries to update the RMRIS/GIS database on, at minimum, a semi-annual basis As part of the Forest Plan Revision process, an extra effort has been made to update the database, forestwide, to more accurately represent forest conditions Hence, the Forest does not feel this is necessary as a guideline or standard

3 2.36 Concerns were raised that there were no maps or descriptions of where old-growth or late-successional forest stands were expected to be harvested in the next 10 years of the Plan.

Some idea of where late-successional forest stands would be harvested can be determined by viewing both the preferred alternative map (showing allocations where harvesting can occur) and the suitable lands maps (showing where harvesting is scheduled under both experienced and full budgets) It is not within the scope of this Forest Plan Revision to display site specific details When proposed timber sales are analyzed for effects, site specific details will become evident

3.2.37 "Many narrow roads in the forest are hazardous to log truck traffic "

There are two aspects to this issue First, some roads are unsuited to log truck traffic until those roads are upgraded or reconstructed to meet standards for maximum steepness, minimum radius curves, minimum width, and minimum vegetation clearing (along the sides to allow clearance and sight distance) Secondly, the Forest looks at whether log truck traffic can or will encounter other traffic (special use permittees, other agency personnel, and the public) Then road design must again be looked at to see if there are pullouts or enough roadway width to allow two-way traffic, and if sight distance is adequate Proper signing must be posted and maintained, by either logging companies or the Forest If these conditions are met, the Forest will allow log truck traffic on forest roads

Both log truck drivers and other forest road drivers must practice safe and responsible driving habits

3.3.1 The RGNF should reduce the planned volume amount and area harvested because a) full budget funding levels for ASQ and acres harvested are nearly equal to maximum

levels for alternatives reflecting high extractive emphasis, b) the Forest may "be forced to honor the 21 mmbf ASQ with inadequate staff to monitor timber sales and protect the environment, c) alternative D represents an increase over the existing ASQ, or over recent sale volumes, or d) the amount is not sustainable

The RGNF is expected, under experienced budget levels (the more likely scenario), to harvest 11 5 MMBF (28 9 MCCF) of conifer sawtimber, and to harvest 21 2 MMBF (51 9 MCCF) of conifer sawtimber and 1 9 MMBF (11 2 MCCF) of aspen sawtimber under full budget The difference in acres harvested between experienced and full budgets is largely due to economics -- i.e , more dollars (from either greater appropriations, or more revenue from the sale of timber) supports timber management over a larger area, and vice versa Under experienced budget levels (which do not reflect the expected decrease in funding of eight percent per year for the next three years), 1,594 acres are expected to be harvested per year for the next ten years, or 0 86% (less than one percent) of the Forest The full budget scenario is about two times the harvested volume for the experienced level, the area affected would be two percent of the entire forest (again, for the decade) The RGNF feels that harvesting such a small percent of the Forest, while meeting protective standards and guidelines, reflects a reasonable and sustainable ASQ

The RGNF responds to its ASQ relative to existing forest conditions, management priorities, and funding/staffing levels The Forest does not view ASQ as a target -- it is a measure of the Forest's capacity to produce a sustainable supply of timber on suitable lands given full program funding (and, indirectly, staffing) and inherent constraints (e g , standards and guidelines) The preferred alternative, under experienced funding levels, reflects a harvest level that is consistent with the volume of sawtimber sold over the last several years It does not represent an increase, the current ASQ is 25 MMBF The recent drop in annual sawtimber volume sold is due to declining funding and staffing levels, adherence to more strict standards and guidelines, and more time-consuming tasks and requirements tied to sale preparation (e g , more detailed NEPA analysis/decision documents and appeals, greater accuracy required by tree measurement sales)

3 3.2 A timber purchaser indicated that "a consistent and steady supply . . of 33 million board feet per year is absolutely necessary for us to remain economically viable."

From 1982 to 1991, Forest sawtimber sale levels averaged 28 MMBF per year The amount you state as "absolutely necessary" for you "to remain economically viable" has only occurred sporadically during that period, and is much higher than any volumes since then as the Forest's sale volume has declined below 10 MMBF

3.3.3 Many commentors gave their estimates as to what they felt the Forest could produce (ASQ)

Most anyone intimately familiar with the Forest's resources (e g , timber industry officials, environmentalists, Forest personnel) has, at one time or another, estimated what the RGNF could produce in sawtimber ASQ Unlike those rough estimates, the preferred alternative incorporates the current inventory, accepted growth/yield and economic models and values, a balance of resource allocation, and experienced budget levels to arrive at a more precise value

3.3.4 The DEIS has misrepresented annual sawtimber production at 14 MMBF even though volumes in the last few years have been much less.

The statement discussing "current rate of production" has been changed to more accurately portray recent volume sold Net timber growth has been added to various points in the final documents to display growth in context with removals The use of experienced and full budget scenarios also helps to more accurately reflect potential outputs given varying levels of funding

3.3.5 The DEIS omitted acres and MCCF of sawtimber harvest for alternative B on page 3-147.

The information you are referring to is contained in the first line of the paragraph speaking to harvest levels among the alternatives

3.3.6 "The concern that too much is being harvested is that of a vocal minority."

Some comments received from people who reviewed the DEIS/FP and other documents *reflect concerns that you noted But numerous other letters expressed concerns that the* RGNF, and the Forest Service in general, is harvesting too much on national forest lands Of approximately 1000 comments tied to timber resource issues from the draft EIS/FP, total volume harvested was one of the most dominant issues About 38 percent of those that expressed opinions regarding ASQ felt that expected volumes, under the preferred alternative, should be reduced

3.3.7 "Where has the [RGNF] demonstrated .. that a 22 MMBF [ASQ] is sustainable, when a 25 MMBF harvest is definitely not?" How could an ASQ over 20 MMBF be implemented without substantial clearcutting and shelterwood seed cuts?

The DEIS, discussed such differences in Chapter 2, with supporting information found in Chapter 3 and within various appendices (particularly Appendix M)

3.3.8 Discussions of volume are in MBF, from the past, with future harvest volumes in MCCF.

We apologize for not presenting volumes consistently There are difficulties in presenting volumes in both board feet and cubic feet because the ratio of one to another varies due to the size of timber that is being cut Generally, there is a range of four to five board feet per cubic foot for softwoods (conifers), and hardwoods (aspen) varies from 2-4 board feet per cubic foot In the past, sawtimber was always sold in board feet In the 1990's, the Forest began selling sawtimber in cubic feet Most volume figures from the past do not have corresponding information on the size of the timber being cut Hence, past volumes are always shown in board feet We have tried to give both cubic and board foot measurements, for future expected volumes, in the FEIS

3.3.9 The preferred alternative full-implementation ASQ exceeds a Forest Plan amendment, dated 8/9/91, that reduced the Forest's ASQ down to 14.5 MMBF in 1996.

A press release from that time indicated that the Forest could not meet the current plan ASQ of 25 MMBF due to constraints of existing standards and guidelines and decreased funding levels There is no Forest Plan amendment that dropped the ASQ to 14 5 MMBF

3 4 1 The Forest should analyze an alternative that yields an ASQ of 33 MMBF, in line with the ASQ of the initial existing Forest Plan.

The Forest feels that a sustained yield of 33 MMBF would involve placing a greater emphasis on timber management than on other resources This EIS and FP attempts to balance timber management with other resources while ensuring protection of soil and water resources and biological diversity

3.4 2 Concerns were raised that the 10-year plan does not provide a sustainable cutting scenario.

The RGNF used accepted models (FVS and FORPLAN) for determining levels of sustainable harvest, over suitable lands scattered around the Forest, through a 200-year planning horizon Though many outputs are displayed for only the 10-year period of the Plan, each alternative displayed represents a sustainable harvesting approach

3.4 3 "How long before all merchantable timber is cut?"

All merchantable timber will never be completely cut Harvesting will be occurring over a *small area (i e , annually on 1,594 acres as tied to ASQ, plus insignificant amounts of*

cutting for non-timber purposes) while, concurrently, growth/regrowth will be occurring over a much larger area (i e , on the Forest's 1 2 million acres of forested ground)

3.4.4 **The current Plan Revision process should use Stage I inventory data for growth and yield models. This inventory data indicates that " . an ASQ of 33 MMBF is sustainable. " and ". is not dependant on even-age management." "Stage II and RMRIS data does not cover the entire forest, and the portions that are covered are not randomly selected."**

The Forest Service has a policy to establish and monitor permanent plots in order to assess long-term growth and yield These permanent plots in the Rocky Mountain Region are termed "Stage I" timber inventory Stage I inventories are performed on an infrequent basis (about once every 10-plus years) and sample a very small portion of the Forest

In contrast, "Stage II" timber inventory data is collected whenever the Forest desires timber information for a particular stand There are various "levels" of Stage II data, varying from level I (photo interpretation) to level IV (detailed, statistically valid plot data) Most stands which have been entered (or proposed) for harvest have been inventoried with the level IV protocol Stage II data has been collected for approximately 30 percent of the Forest, a much greater area than that inventoried with Stage I permanent plots

The Forest used the Stage II inventory data because it more accurately depicts timber stand conditions than Stage I data, and because it reflects growth and yield for those stands most likely to be managed Also, the growth and yield model, FVS (Forest Vegetation Simulator), is adapted for use with Stage II data

3.4.5 **A suggestion was made to develop an alternative around the concept of "sustainable development", which would expand the use of silvicultural treatments, using the full range of stewardship means to accomplish ecosystem management.**

The Forest feels that the current range of alternatives allows for the flexibility to expand silvicultural treatments across a larger area of the RGNF -- given expanded budgets A full budget scenario could result in an ASQ of 21 2 MMBF (51 9 MCCF) of conifer sawtimber and 1 9 MMBF (11 2 MCCF) of aspen sawtimber Additional wood products could come from unsuitable lands if silvicultural tools were seen as the best means to reach objectives. Realistically though, experienced budget levels preclude a dramatic expansion of silvicultural treatments.

3.4.6 **"No age data was included in the RMRIS data." Late-successional forest sites reflected a low net growth, indicating ". a tremendous amount of mortality is occurring on these sites." A comparison of actual growth to potential productivity indicates that late-successional forest stands reflect growth that is half of potential productivity Timber productivity and site index, as measurements of site potential, "..should have much more emphasis in this analysis to enable cost efficiency comparisons to be more realistic."**

Many of the Forest's stands are multi-aged so stand age is not a good indicator High mortality and low net growth in late-successional forest stands would be expected These conditions could lead one to expect high productivity from a biological diversity standpoint The presence of numerous decay organisms and processes may well point to a rich, resilient ecosystem that is able to adapt to changing conditions Unfortunately, these benefits cannot be quantified and are rarely emphasized

Site index is not given as much emphasis because a) there are a number of sites for which sufficient data has not been collected to calculate site index, b) the RGNF is characterized by low site indices, and c) other indicators of site potential, such as estimates of volume, tree size, and density, are available.

3.5.1 **Questions and concerns were expressed regarding potential salvage/sanitation harvest activities. One commentor thought Alternative D is "far more vulnerable to massive salvage operations than Plan [alternative] E." Another commentor said that**

the "...lack of clear long-term [salvage] plan ." was an inherent problem in the DEIS/FP, and that this inadequacy had to be corrected before the Forest could "...pursue aggressive salvage and thinning." Similarly, concerns were expressed regarding the salvage rider in the Rescissions Bill, such as: "all the trees which have succumbed to beetle kill are now open for clearcutting..", and "is any back-door 'salvage' possible in view of the 'wackos' in Congress "

Salvage cutting could occur over extensive areas in alternative E, if deemed as the desired objective, since salvaging can occur on both suitable and unsuitable lands But as stated in the draft EIS, very little salvaging is predicted

Salvage sales are initiated on the RGNF on an ad hoc basis There has been no recent evidence of widespread beetle activity on the Forest Recently, there have been elevated levels of western spruce budworm (WSB) defoliation but few timber sales have been initiated solely due to WSB More often, salvage sales are proposed to respond to a broader array of objectives The Forest feels that the standards and guidelines will effectively guide planning and implementation of any salvage cutting that may occur during the period of this Plan

Beetles generally kill the overstory trees but often leave understory trees (seedlings/saplings, poles, and small sawtimber) unaffected, thus, an overstory removal (not a clearcut) might be planned to remove large dead trees while protecting the understory The Rescission Bill terminates 12/31/96

3.5.2 A concern was voiced regarding dying trees in the Bonanza area.

The Forest will be analyzing the potential for harvesting of dead and dying trees in the Bonanza area The Turquoise Landscape Analysis, which looked at lands near Bonanza on the Saguache Ranger District and adjacent BLM lands, is one example where a project identified objectives for reducing epidemic or high endemic levels of insects or disease

3.5.3 Concerns were expressed with the Silviculture standard that allows exception to the 40-acre limit on openings. Some commentors stated that the Forest must specify the maximum size for exceptions Also of concern was the lack of specific guidelines for the dispersion of openings

The Forest allows exceptions to the 40-acre limit, consistent with regulations, when meeting either of the following conditions 1) where larger units will produce a more desirable combination of net public benefits Specification for exceptions shall include the particular conditions under which the larger size is permitted and shall set a new maximum size permitted under those conditions, or 2) on an individual timber sale basis after 60 days public notice and review by the Regional Forester

Silviculture Standard #3 provides guidance relative to the dispersion of openings

3.5.4 Concerns with potential salvage sale volume led to suggestions that, "..salvage harvest should be considered in total timber harvest figures."; and that. "Green sales *should be reduced commensurately with increased salvage sales.*" Another commentor thought that if the Forest uses an ecosystem management approach, harvesting to restore ecosystems to healthy conditions could result in high volumes that will run up against the ASQ limit.

Salvage sales can occur on either suitable or unsuitable timberlands Dead or dying timber which, at the time of ASQ calculation, was green volume included in the forest planning yield tables, is chargeable to ASQ ASQ-chargeable salvage, that would cause the decadal ASQ to be exceeded, is allowed without a Forest Plan amendment if it is not feasible to substitute the salvage volume for green volume that would otherwise be sold and be chargeable to the ASQ

Non-ASQ salvage volume, which meets utilization standards as sawtimber, becomes part of the Salvage component of the total Timber Sale Program Quantity This salvage volume will not be substituted for any "green" volume Also, this volume is not constrained by

Timber Sale Program Quantity limits, so in the event of extensive ecosystem restoration through salvage sales, the Forest would not be limited relative to this volume component

The Forest does not anticipate an enlarged salvage sale program as compared to the current plan

3.5.5 **On page 3-190 of the DEIS, "high value resources" is mentioned in relation to influencing salvage/sanitation harvesting. "Is [this term] Forest-speak for true old growth?"**

The intent of this statement is to point out that salvage/sanitation harvesting will probably not occur if high value resources are threatened or adversely affected by the harvesting Old growth can be considered one of many high value resources

3.7.1 **Concerns were expressed that the RGNF is catering to the Stone Container/Forest Industries mill, and should avoid expanding Stone Container's logging operation.**

The Forest offers timber sales to meet management objectives Sawmills, such as the Stone Forest Industries mill in South Fork, may (or may not) adapt their management to the RGNF's timber offer and that of other regional forestland sources

3.8.1 **Numerous comments expressed concern over the amount of volume removed and area harvested, on the RGNF, in past years, and how those areas have not regenerated or not recovering from harvesting.**

Approximately eight percent of the RGNF (or 13 percent of the forested lands on the Forest) has been harvested since the 1950's Most of that harvesting has been with partial cuts, and virtually all harvested areas have growing trees upon them

3.8.2 **Commentors expressed concerns with intensive logging in areas of the Forest, some vague as to location, others more specific (e.g., "We have seen the overkill of logging from Del Norte Peak to Wolf Creek Pass..").**

"Heavy" or "excessive" logging is highly subjective, depending upon the perceptions of the viewer Standards and guidelines will provide protection for soil, water, biological, and social (e g , visual) resources

Some of the most productive timber-growing sites on the Forest, such as the Del Norte Peak to Wolf Creek Pass area, have been affected by harvesting in the past more so than less productive sites since it is more economically efficient to manage for timber products on those productive sites In addition, an extensive spruce beetle outbreak, in the 1970's, resulted in heavy mortality of mature Engelmann spruce in the area south of Del Norte Peak Subsequent salvaging of the dead trees resulted in heavy logging impacts in that area The dead spruce trees could have been left to fall and decay on-site but this would have resulted in unstable snags creating hazardous conditions for people in the area, heavy fuel loadings making fire suppression and other activities difficult to do, and jackstrawed timber impeding movement for people and large animals

3.8.3 **Conclusion #3, on page 3-158 of the DEIS, "..is a very debatable statement.."**

The RNV statement #3, for Timber Resources, refers not only to area harvested on the Forest since approximately 1955 (about the time that the RGNF began keeping records on timber harvest) but also to the effects of wood products removal occurring before that time, as noted in the RNV Early wood products removal included heavy logging of Douglas-fir, ponderosa pine, and lodgepole pine from 1875 to 1908, and logging of Engelmann spruce on a large scale in the 1930's

3.8 4 **Some commentors questioned the estimate of 7.7 percent of the Forest, or 12.2 percent of timber-covered lands of the Forest, as affected by harvesting Concerns were that estimates were low and inaccurate, with some indicating that harvesting**

has covered a larger area when considering that which occurred in the late 1800's to early 1900's

The abstract, to the Timber Resources section in the DEIS, briefly stated that 7.7 percent of the (total) Forest has been affected by harvesting The main portion of that section explained in greater detail how Forest area affected by harvesting can be traced back about 40 years -- the period during which records have been kept (one record dates back to 1920) Other periods of extensive harvesting were discussed in the RNV report, with some general conclusions on those effects across the Forest Some of this information has been updated in the final EIS The Forest's records indicated that 8 1 percent of the Forest (or 12 9 percent of forested lands on the RGNF) have been affected by harvesting These numbers represent the most accurate, up-to-date data on RGNF harvested area

3.8.5 ***How encompassing of effects from harvesting is included in "acres affected"?***

Records for acres affected by harvesting include all the acres within which silvicultural treatment occurred That includes entire cutting units, skid trails, landings, and segments of haul roads inside those cutting units Segments of haul roads outside cutting units are not included in affected acres, but those road segments are included in effects sections discussing total forest road mileage Effects on other resources -- wildlife, water, etc -- are covered in sections describing those resources

3.8.6 **" . the Forest should use a percentage based on the total available timber base.." to inform the public about future timber cutting on the RGNF.**

The discussion of cumulative effects of timber harvesting was to show how much of the Forest has, and could be, affected by harvesting The approach to reflect that portion of the Forest as a percentage of the total forest and total timber-covered lands, is merely to show how timber resource management compares to lands not managed for such resources We feel this is an accurate and appropriate representation

3.8.8 **A concern was raised that the representation of cumulative effects across the entire Forest "gives a completely different understanding" than displaying effects by smaller areas, such as Colorado DOW wildlife units.**

The Forest does not track activities by CDOW units forestwide, though we do look at effects on CDOW units when performing project-specific analyses Appendix K does display the percent of watershed area disturbance, by source of disturbance, for all watersheds on the RGNF, hence, a more accurate assessment of disturbance can be deduced to particular areas of the Forest Forest staff will use this information in monitoring and evaluation and in analyzing proposed management activities.

3.8.9 **The total number of acres that have been affected by harvest "..is understated because it does not include the untold cutover acres that have not yet been recorded in the RMRIS database."**

Timber harvesting records date back as early as 1920 Until the RMRIS database was activated, records were kept as hard copy maps and line data During the 1980's, all timber harvest records were transferred to the RMRIS database, and recent/current harvesting has been updated annually Harvesting that occurred prior to record-keeping is not reflected in discussions of cumulative effects because identifying such old sale areas would be an extraordinarily difficult task, for which there is neither funding nor staffing to accomplish

Forest staff tried to attribute cumulative effects, in the DEIS and Appendices, to the period in which they occurred, and tried to draw fair perspectives from those periods of varying activity

3.8 10 **"Where, in evaluation and monitoring and pre-project planning, does the Forest plug in the 'known impacts' to ecosystems from ...timbering?"**

Impacts are displayed and discussed in monitoring and evaluation reports and in NEPA analysis documents That information is then shared with Forest staff that have ties, directly or indirectly, with affected resources

3.8 11 "..each [timber] project should be monitored and the results reported in the annual plan."

All Forest projects are monitored to some degree, though not all projects are monitored equally Projects are randomly selected for a fully comprehensive monitoring and evaluation assessment, with results displayed in the annual plan Though randomly selected, the forestwide monitoring/evaluation team picks from a pool of the more complex and controversial projects for its annual assessments

There will be some timber sales that will not be monitored by the forestwide team due to constraints of time, budget, and staffing But all timber sale areas are inspected repeatedly by members of the Timber Sale Administration and Contracting team (centered out of the Delta office of the Grand Mesa/Uncompahgre/Gunnison National Forest) during harvest operations, and by various RGNF staff, during timber sale and post-sale periods Sale inspections are documented, as are most sale area visits, by USFS personnel, with information readily shared between staff

3.8.12 "..there is more forest today in the U.S. than there was 200 hundred years ago."

In actuality, as reported in U S Forests in a Global Context (Rocky Mountain Forest and Range Experiment Station General Technical Report RM-228, 7/93), in the 17th and 18th centuries, one-half of the country was forested Today, approximately 30 percent of the U S is forested, and " less than 10 percent of the U S forest area is undisturbed by recent human use or management "

3.8 13 The characterization of impacts of road construction on timber resources (on page 3-163 of the DEIS) makes it sound as if much more ground is affected than is actually impacted

The intent of stating that roads convert forest ground to roadway and split up forest stands with road corridors was to objectively portray the impacts of road construction. The final EIS now discusses the actual acreage within new roads to better display the context of this impact relative to total Forest acreage

3.8.14 Requests were made for the Forest to display the "actual percentage of the merchantable timber that has been cut ." or to determine "..what degree . timbering practices [have] depleted the density of large trees and forest canopy volumes.."

Harvesting has occurred on the Forest since people settled in this area (General information on historical timber use can be found in the Range of Natural Variability report, Appendix A of the FEIS) Data on harvesting, on the RGNF, was first recorded about the mid-1950's During the last 40 years, the Forest has gradually added to its timber inventory database But due to the dynamic nature of forest vegetation, the lengthy period of removals, and the lack of data during much of this time of removal, no reliable estimate could be made for the percentage of merchantable timber that has been removed or the effect on large tree density and forest canopies What information the Forest lacks on removals is made up for with information on what exists now Growth in all size and age classes has been occurring concurrently while removals have taken place

3 8.15 "The Plan..does not substantively consider recreational impacts in the timber resources assessment. .or in its prescriptions.."

The final EIS includes some added information, but as noted in the DEIS, the effects on timber resources from recreation are expected to be minimal

3.8 16 In Table 3-39 on page 3-162 of the DEIS, there is very little variation in acres affected between experienced and full budget scenarios for alternative D, whereas there is a vast difference in ASQ between these budget scenarios.

Under a full budget alternative D scenario, there would be more first entries into undeveloped lands with group or single-tree selection and shelterwood preparatory cuts These cuts often result in little change in stand structure With budgets constrained under experienced levels, there is a greater proportion of second entries into areas previously harvested, resulting in a larger proportion of stand structure alteration

3.9.1 **Most commentors supported the Forest's efforts to allow firewood gathering. One individual thought that the Forest reflected uncertainty in its DEIS discussion on projected firewood access, thereby making comparison across alternatives inadequate. Many questioned that the RGNF is not providing adequate or timely access to firewood, or is actually reducing access. Some supported commercial firewood permitting while others opposed it.**

The Forest appreciates support in its efforts to provide firewood for those that use this resource

Much of the Forest's firewood availability is tied to timber sales -- that is, sales provide both access and supply Limited availability and/or accessibility to other forest products, from suitable lands, will vary depending upon funding, staffing, and timber sale conditions and issues Additional uncertainty lies with the possibility of increased availability and/or accessibility to products as the result of management outside of suitable lands, from salvage operations to fuel reductions to cuts for enhancing wildlife habitat

The intent to close some roads on the Forest is not to cut firewood gathering access but to reduce damage that is occurring to soil and water resources The roads planned for closure represent such a small fraction of the total road base for the forest as to have a minimal effect on wood cutting. The Forest believes a greater influence on firewood availability will be the reduction in timber sales as compared to the last 10 years

The RGNF is constantly assessing dead and damaged trees for firewood to meet demands of local residents, and timber sale roads are often left open for one or more summer seasons, following sale closure, to provide such access

The permitting of commercial firewood gathering may be desired where specific management objectives may not be achievable through personal-use permitting Examples might be where accessibility is limited or the area is remote from users, or where risks for erosion are greater, both conditions could warrant a need for contractual control to prevent damage to soil and water resources

3.9 2 **Comments varied as to whether permits for firewood gathering should be required and/or whether fees should be charged for firewood**

Firewood gathering for campfire (day) use can occur over the entire Forest without a permit Firewood cutting for home fuel use requires a permit Sometimes, remote areas of the Forest that have high fuel loadings will be identified as low, or no, fee areas for firewood gathering A fee is charged for most firewood gathering because wood, like other forms of fuel, is a valuable resource Firewood permitting was enacted to recover some of that value and protect the interests of the American public in their resources

3.9.3 **RGNF prohibition of commercial firewood cutters filling personal firewood permits is a hardship for both commercial cutters and firewood users alike. Requiring commercial firewood cutters to bid on permits and complete cutting within certain timeframes is counter productive. The new rules favor wealthier cutters and has put some commercial cutters out of business.**

The policies mentioned have been developed to protect the interests of the American public in a valuable resource (firewood) and to treat all users fairly These policies are not intended to hurt commercial or private users of Forest resources The Forest values the work that can be accomplished on the RGNF by commercial firewood cutters

Fees for private firewood permits are set to minimally cover administrative costs for the firewood program and to reflect some minimal cost for the value of the resource Fees for

commercial permits are set a bit higher to reflect a fair value for a resource that will be sold in the "market" The policy prohibiting commercial cutters from filling personal permits is similar to other types of permits Outfitter guides, Wolf Creek Ski Area, and other special use permittees must return some portion of their earnings to the American people for the privilege of making profits off public lands. Arrangements for commercial cutters to fill private permits allows commercial cutters exclusive rights to a public resource with no compensation to the American people

The bidding of permits and setting of time limits for completion of commercial firewood permits follows the same pattern as required in other wood product sales (sawtimber, post and pole sales) and is therefore more fair to all commercial users of wood products Bidding results in fair market accountability for the resource Time limits assure that jobs are finished in a timely manner and makes administration of the firewood program more efficient

3.10.1 **Many commentors expressed concerns with how much of the Forest was designated as tentatively suitable timber lands (TSTL), with the credibility of the resource database, and with how little or how much of the Forest was designated suitable (under the preferred alternative). Some felt that the large area of suitable lands would heighten risk to biological diversity. Some thought that trees on the RGNF grow so slow that suitable land area should be reduced. Also, many felt that areas harvested in the past should not be suitable because these stands were in a state of recovery.**

The TSTL do make up a fairly large part of the Forest Approximately 40% of the Forest is tentatively suitable for timber production The amount of TSTL allocated to prescriptions permitting timber harvesting varied from 0-85% The mix of prescriptions between alternatives was based on the theme of each alternative The actual prescription allocations were based on scientific information and the goals of the alternative The ASQ and determination of suitable timber acres (Stage III analysis) was based on the prescription allocation of each alternative, the resulting acreage allocations, and the constraints associated with the standards and guidelines

Under the preferred alternative, of actual suitable lands, five management areas (MA's) allow harvesting to meet ASQ volume (4 21 - Scenic Byways/Railroads, 4 3 - Dispersed Recreation, 5 11 - General Forest and Rangelands, 5.13 - Forest Products, and 5 41 - Deer/Elk Winter Range) The area contained within these MA's (for the preferred alternative) makes up approximately 41 percent of the total forest acreage (actual suitable lands within these MA's is 23 percent), leaving the remainder of the Forest not scheduled for harvesting Hence, most of the Forest will not be subjected to harvesting, thereby allowing natural processes to function naturally over the great majority of forest lands

Maps in the EIS and FP illustrating suitable lands display areas that are expected to be harvested within the 200-year planning horizon -- a span of time broad enough to reflect growth and yield in RGNF forest stands The fact that suitable lands are shown on these maps does not mean that these areas will be entered during the ten-year period of the Plan Some suitable lands harvested in recent years may not be entered again for many years, allowing those areas to recover and grow until such time that the trees are once again in a mature, merchantable condition Together, the growth and yield (FVS) and the timber suitability models (FORPLAN) incorporate the current condition of inventoried stands, thereby taking into account those areas that have been recently cut They are not taken out of production because those areas are growing now and well into the future

Additionally, it is not assumed that biological diversity is lost where harvesting has occurred. Some species better adapted to early forest seral stages will be drawn to harvested areas Species adapted to late-successional forest may migrate away from harvested areas -- and return as these areas grow and recover This progression is not unlike that found when natural disturbances create early seral conditions

3.10.2 **Several commentors suggested dropping some lands from the suitable land base. Many commentors indicated that roadless areas should not be entered, or that harvesting should only occur where roads already exist Some descriptions for these**

areas were vague, therefore, difficult to identify. Some were more descriptive (e.g , Kitty Creek, Park Creek). In contrast, some felt that these areas "..should be made available for development."

The program model used to determine suitable lands does so by selecting those timber stands that are most profitable to harvest, depending on existing stand conditions, current or potential access, and a number of constraints, such as standards and guidelines and management areas

All roadless areas that contained suitable lands were again reviewed closely by forest personnel to more accurately assess roadless boundaries (e g , existing roads were found within some roadless areas, so corrections were made to the areas) and to determine if they were truly viable (for timber management), with respect to issues, existing conditions, and economics. As a result of this analysis, no roadless areas are planned for entry under expected funding levels for the ten-year period of the plan If the Forest is fully funded, one roadless area will be entered in the first decade Some of the roadless areas initially identified for entry, in the draft EIS, have been dropped from a suitable timberland status and changed to a Backcountry prescription Harvesting or road building will be prohibited in the Backcountry MA.

Most harvesting in the next ten years will occur in areas with existing road systems Please consult the revised preferred alternative maps showing management area allocations and suitable lands.

3.10.3 **Concerns were expressed, or suggestions made, as to where harvesting should, or should not, be allowed.**

Harvesting is prohibited in Category 1 (wilderness), and will not be allowed in RNA's, or Backcountry Prescriptions Harvesting could occur in Special Interest Areas, Scenic Rivers, and all category 4, 5, 6, and 8 areas, to meet objectives consistent with that specific management area (MA) Scheduled harvesting, as tied to ASQ, is only allowed within suitable lands

3.10 4 **The Trout Mountain, Kitty Creek (above Shaw Lake), and Spruce Creek areas should be dropped from the suitable land base**

The Forest has performed site specific analyses, and issued decisions to harvest, in both Trout Mountain and Spruce Creek areas, each which will require road construction to access the timber Those decisions are currently under appeal The Kitty Creek area has been harvested in the past and is one of the most productive timber-growing areas on the Forest The preferred alternative is consistent with past management decisions and activities

3.10.5 **The RGNF failed to disclose "all of the areas that have been deforested by past timber harvesting."**

As part of the forest plan revision process, the RGNF has been updating its RMRIS database The Forest does have a reforestation backlog but has been working hard to check all those sites that have had a final harvest removal to see if stocking meets minimum standards Most of those sites that require inspection are a) areas that were harvested prior to the passage of the National Forest Management Act (1976), or b) areas that have been harvested since 1990 Most a) areas will have regenerated by now Most b) areas were small patch clearcuts or group selection cuts that should have favorable conditions for fostering regeneration. All areas inspected during the last three field seasons were found to have sufficient regeneration to meet minimum stocking standards except for the Bear Creek/Deadman Timber Sale areas (where planting is now being scheduled) Reforestation, generally through natural means, is occurring concurrently with harvesting The Forest is monitoring and evaluating regeneration in harvested areas on an annual and as-needed basis

3.10.6 **"Can areas such as [Park]/Beaver Creek tolerate any additional cutting without irreparable resource damage?**

Areas such as Park/Beaver Creek can tolerate additional cutting without irreparable damage -- through the effective use of mitigation measures, monitoring and evaluation coupled with adaptive management, and allowing rehabilitation and restoration of disturbed sites to occur with time

3.10.7 The DEIS was inadequate in not discussing demand for aspen, nor in discussing the potential effects of cutting on aspen.

The Final EIS/FP includes suitable aspen forestlands as a separate component, with resulting outputs (ASQ, acres affected, under experienced and full budget funding)

3.10.8 Concerns were expressed that " the forest should be extremely careful not to cut timber wrongly designated as suitable ", or that "The identification of unsuitable lands in the DRFP is unsatisfactory..."

The Forest explicitly followed the process, adopted by the Forest Service, for identification of lands tentatively suitable for timber production The Forest has a complete soils inventory and an extensive timber stand inventory Those lands can be identified, by site/stand, in order to verify suitability, hence, this process has concurrently identified those lands unsuitable for timber production

3.10.9 Suggestions were made as to how the Forest should amend the EIS/FP relative to ASQ

The Forest intends to monitor and assess suitability, and adjust ASQ, in accordance with the Monitoring and Evaluation Plan and Forest Service standards

3.10.10 Inconsistencies in how suitable lands were identified in the DEIS were pointed out.

The omission, in the Timber Resources section abstract of the DEIS, of suitable lands found in management area 3 21, was corrected for the FEIS The wording "suitable lands are found in" is correct All management areas that include suitable lands also include some sites that are not suitable Generally these are non-timbered sites (e g , cliffs/talus, meadows)

3.10.11 The last paragraph of page 18 of the DEIS Summary does not mention miles of new roads planned for alternatives other than B and NA.

The portion mentioned did not discuss road construction in other alternatives as there was none expected under the experienced budget level

3.10.12 Comparing DEIS suitability maps for alternatives B and D, why are some areas suitable in D though not in B?

The differences between the maps reflect the variations in allocation between the alternatives

3.10.13 Scenic Byways and Railroads Management Area, 4.21, should be unsuitable for timber production.

The Forest feels that Scenic Byways and Railroads should reflect the range of conditions and management that occurs on a National Forest, including opportunities for timber management Tentatively suitable timber lands within Scenic Byways and Railroads Management Areas that can be harvested to meet objectives consistent with the 4 21 prescription should be suitable for timber production

3.10.14 A suitable timeframe for renewal of harvested areas, before harvesting occurs again, should be developed. The timeframes " should not be shorter than the average age of market sized timber existing in the area... An annual percentage of harvestable timber based on this sustainable timeframe should be calculated.. and not exceeded in any one year."

Both FVS and FORPLAN models use growth and yield information from the Rocky Mountain Region that is then further modified to more accurately depict conditions on the RGNF This information was incorporated into estimates for the draft and final EIS/FP's Additionally, even-aged stands cannot be harvested to meet ASQ until such stands have reached culmination of mean annual increment The assumptions incorporated into the models, plus the implementation of standards and guidelines, will ensure that recovery and renewal occurs between regeneration harvests

3.10.15 MA 5.13 - Forest Products was suspected to be inappropriate for the RGNF. A commentor thought that this MA could prevent the perpetuation of biological diversity, and if uncertainty arose in its application, these areas should be changed to MA 5.11 and/or MA 5.13 be eliminated altogether.

Forest staff have reviewed the use of MA 5.13, and areas allocated to this MA, several times -- including another review between the issuance of the DEIS/FP and the final analysis and decision documents Some areas allocated to 5 13 in the draft phase have been reallocated to other MA's in the final

The elimination of MA 5 13 from RGNF allocations is unnecessary from a biological diversity standpoint in that many habitat elements will be retained in areas subjected to harvesting and potential harvesting of these areas will be across such a small portion of the Forest while large blocks of the Forest will remain unaffected by harvesting

3.10.16 A recommendation was made that the Cumbres Diversity Unit and unroaded areas that are proposed as MA 5 13 be changed to MA 5 11

The preferred alternative includes allocations for both MA 5 11 and 5 13 within the Cumbres Diversity Unit This diversity unit contains some of the most productive soils within the entire Forest, and some of the Forest's best stands of spruce/fir About 30 percent of this area has been harvested at one time or another -- and could be allocated to Timber Products Emphasis (5 13). But to better respond to the recreational/scenic resource use in and around Trujillo Meadows and Cumbres Pass, MA 5 11 (General Forest and Rangeland) has been allocated to that particular area within the diversity unit, while allocating MA 5 13 (Forest Products) to the upper Los Pinos area The Forest feels that this allocation for the Cumbres DU is appropriate

3.10.17 "It is inconsistent that Alternative A [has allocated lands in MA 5.11] and that no lands will be designated suitable nor scheduled for timber harvest."

The Forest analyzed a range of alternatives as part of the Forest Plan revision Forest staff felt that an objective comparison of alternatives, relative to harvest levels, could best be made if one alternative reflected no harvest scheduling and no suitable lands Alternative A was seen as the alternative best reflecting a theme of zero ASQ Alternative A includes other MA allocations which would be suitable in other alternatives but are also unsuitable in this alternative (e g , 4 21 - Scenic Byways or Railroads, 4 3 - Dispersed Recreation, 5 41 - Deer and Elk Winter Range)

3.10.18 The term "scheduled", from "suitable and scheduled" (page S-4 of the DEIS) was questioned.

"Scheduled" merely refers to those lands that fell within the suitable land base which were selected as scheduled on the basis of FORPLAN model ASQ calculations

3 10.19 A cabin owner opposes allocation of lands around Bonanza to a timber production emphasis.

There is both MA 5 11 - General Forest and Rangelands and 5 13 - Forest Products allocations around the Bonanza area This area has been impacted by various activities, largely roading, mining, and harvesting The Forest feels that harvesting should mostly occur within the already roaded base, where harvesting may already have occurred Any proposed harvesting near Bonanza would take into account other activities in that area,

including recreation The Forest feels that this allocation is appropriate and consistent with the preferred alternative and past management

3.10.20 "The DEIS does not demonstrate how the prevention of irreversible damage to soil productivity and watershed ... will be achieved ", by not identifying the technology which will ensure protection of soils and watershed conditions from the effects of timber harvesting.

This concern ties with the second of five criteria in determining the amount and location of tentatively suitable timber lands (TSTL) This criteria removes lands from timber production if there will be irreversible resource damage to soil productivity or watershed conditions, as required by CFR 219 14(a)(2).

Soils may be damaged by erosion, nutrient removal, compaction, and mass movement Of these, erosion, nutrient removal, and compaction may by mitigated on site, but landslide-prone areas are difficult to mitigate

Harvesting in riparian areas and wet soils can be mitigated by winter logging, logging on snow or frozen soils, horse logging, or by means which transport the logs suspended above the ground (balloon, helicopter, or full-suspension cable systems) Also, it should be noted that riparian areas are not included in the suitable timber land base

Soil map units include a rating for mass movement potential, with ratings from very low to high Tree removal on soils with high potential for mass movement could change soil water balances, resulting in mass movement In general, soils with high mass movement were determined unsuitable for timber harvest under existing technologies These soil map units were excluded from the TSTL base, thereby protecting those soils and watershed conditions from harvest activities

The Forest's specialists, in reviewing the types of timber harvesting technologies available for use on the RGNF, have developed standards and guidelines that specifically protect soils and watershed conditions on TSTL's Additionally, the Forest has performed a Watershed Assessment that has identified the level and type of disturbance, coupled with potential erosion hazard, and ranked watersheds relative to past and present disturbance Watersheds, containing suitable timber lands and reflecting high levels of disturbance, were constrained from harvesting for few to many decades to allow those lands to recover from past harvest activities, or until field surveys document that streams have not been impacted

3.11.1 Numerous concerns were raised about clearcutting, both past and expected. Some felt that clearcutting was deemed inappropriate in spruce/fir, or in any cover types on the RGNF Some felt that RGNF clearcuts have not regenerated or are growing slower than expected. Some thought that most or all cutting planned on the Forest would be by clearcutting. One commentor wanted to know how much of past clearcut stands were old growth. Some thought that existing standards and guidelines were not sufficient to provide resource protection in clearcut areas -- and would be especially adverse relative to visuals and connectivity if clearcuts were aggregated together. One commentor suggested that trees be reserved within clearcuts.

Clearcutting has occurred on approximately 14,100 acres, or 0 8 percent (less than 1%) of the Forest That equates to 1 2 percent of forested lands Clearcutting was the predominant silvicultural method for cutting large areas of spruce/fir in the 1960's and early 70's Clearcutting was found to be inappropriate to that type of forest because of regeneration problems, both artificial (planting) and natural -- because the large open areas did not provide adequate protection, for seedlings, from climatic extremes

Several tables in Chapter 3 of the FEIS, show acres harvested by cover type and by silvicultural cutting method per ten-year period from prior to 1955 to the present Taken together with affected environment and cumulative effects discussions for the various resources, one can get a sense for the cumulative effects from clearcutting It is impossible

to quantitatively determine cumulative effects for all resources from past clearcutting because of the lack of effects data from prior periods when clearcutting was occurring The Forest has completed a watershed risk assessment by comparing inventories of all disturbances, by watershed, with soil erosion/mass movement potential, in order to determine the percent of area disturbed by watershed and specify the type or source of disturbance With all the above information, taken in context with areas clearcut on the RGNF in the past, the cumulative impacts for clearcutting have been adequately displayed

We do not know how much of clearcut land was old growth, nor is there any way to determine the amount

Clearcutting is merely a means by which to accomplish timber management Most of the harvesting planned for the next ten years under the preferred alternative will be done with shelterwood (both conventional and irregular) methods (approximately 1,040 acres per year) or group selection methods (504 acres per year) Only 50 acres per year is expected to be harvested in clearcuts, and those clearcuts will most likely be in 3-8 acre patches Taken in context with the total area proposed for harvest on an annual basis, the area planned for clearcut-type harvest amounts to three percent of proposed harvest area, and 0 04 percent of the Forest's forested lands

Forest Plan standards and guidelines provide language that will effectively direct the proper use of clearcutting on the Forest The following standards and guidelines provide most (but not all) of this direction Biodiversity Guideline (Gd) #3, Silviculture Standard's (St) #2-8, 11, Silviculture Gd's #2, 4, 5-7, 10-12, Wildlife St's #2, 5-9, 12, 15-18, Insects and Disease Gd's #1-4 With the Forest meeting standards and guidelines for visual quality, soil resource and habitat protection (along with meeting standards and guidelines for other resources), the implementation of proposed clearcut harvesting is minimal relative to the issues of visuals and habitat fragmentation

Patch clearcuts can be effective at harvesting and regenerating spruce/fir Clearcutting is the most effective means to regenerate both harvested stands of aspen and lodgepole pine, and may be necessary for reducing or eliminating pockets of root rot or mistletoe

The Forest sometimes reserves overstory trees within clearcuts to serve a variety of purposes (e g , for perching/nesting birds, visuals) In most cases of patch clearcutting, the area is small enough not to warrant the difficulty and hazard for loggers of felling all other trees while protecting individual trees within the patch clearcut Also, overstory trees can inhibit the growth of future young trees

3.11 2 "You should consider alternatives that allow cutting."

All alternatives allow cutting Cutting can occur to meet a number of differing objectives, such as for establishment of a new stand, removing dead and dying timber, clearing for roads, etc

3.11.3 Harvesting should be no problem if we plant to replace trees cut down

The Forest believes that planting is generally not necessary to establish young trees after harvesting The RGNF will rely mostly on existing young established trees, commonly called advanced regeneration, to fill in the growing space left after harvesting mature trees In other cases, such as aspen or lodgepole pine, new regeneration from sprouting or seeds can quickly occupy a site after harvesting

3 11.4 A commentor questioned the standard that 'no minimum seedling height *requirements are specified' because "Size of seedlings is often <u>the</u> primary indicator* of vigor."

Yes, the size of seedlings can be an indicator of vigor But greater height growth in seedlings does not guarantee survival, and survival is what is being measured

3.11.5 "Table A-2 demonstrates that S/F forests are not dominated by old stands - 81% are less than 215 years old."

We disagree with the commentor because 60% of spruce/fir stands are greater than 156 years

3.11.6 A suggested standard was to "Consider leaving seed trees un-harvested in shelterwood systems."

The irregular shelterwood method involves leaving seed trees through the period of establishment and growth of the new stand These large older trees can then be harvested at some later time or, more commonly, left to eventually die and decay on-site The irregular shelterwood method was incorporated into FVS and FORPLAN models for the final EIS and FP

3.11.7 "What does 'desired trees' mean?" References were made to 'undesirable trees'. "Undesirable to whom? To Nature?"

Just as the term "old growth" can be laden with value judgements, desirability of trees species is laden with human value judgements What is key is the objective for determining why one tree species is desirable and another is not

"Desired trees" means simply those trees that are preferable on a site to other vegetation Examples of desired trees might be 1) large ponderosa pine overstory trees in a mixed conifer stand where the objective is to maintain Abert squirrel habitat, or 2) Engelmann spruce saplings in a mixed young stand of spruce and subalpine fir, where the fir is not the preferred crop tree

In old-growth ponderosa pine stands, where lack of fire has allowed Douglas-fir and white fir to out-compete the pine for the site's moisture and nutrients, both the Douglas-fir and white fir may be undesirable when viewed in context with risk of loss of the pine (due to competition, site alteration so that pine cannot regenerate, and increasing catastrophic fire risk due to heavy fuel loading and ladder fuels) Hence, desirability may center on people's values relative to product output (sawtimber), biodiversity, safety (the Forest annually reviews the presence of hazard trees around campgrounds, roads, other facilities), visuals, or other objectives

3.11.8 "Any treatments that are planned with this model [landscape/spatial analysis model] should mimic natural conditions as much as possible."

Silviculture guideline # (13) will cover this issue

3.11.9 Some commentors felt that the forest could support "selective cuts". Others expressed fears that selection logging removes " .the biggest, most biologically valuable trees first.." and "..ushered in a quantum leap in miles of road built per sale."

The dominant silvicultural system in the preferred alternative is group selection

Selection system (uneven-aged) harvesting can result in the largest trees removed from a stand -- unless silvicultural prescriptions are written specifically to retain such trees This issue is assessed with each proposed uneven-aged harvest

Selection harvests have not resulted in increases in timber sale road density on the RGNF Road densities have actually decreased over the last five years as is evident in longer average yarding (skidding) distances (AYD) Longer AYD's are a result of a) economics (i e , better quality skidders can more efficiently skid over longer distances), and b) a conscious effort on the part of the Forest to reduce the amount of roads in timber sales

3.11.10 ". when does the cutting of regrowth begin?"

Cutting of regrowth can occur early in the life of a new even-aged stand, for thinning purposes, or when an even-aged stand has reached culmination of mean annual increment (at approximately 180 years from establishment for spruce/fir stands) In an uneven-aged stand, harvesting will occur on a cutting cycle (usually every 30 years in spruce/fir)

3.11.11 "What kind of regeneration time are we talking about for these forests?"

Final harvest cut (clearcuts, shelterwood overstory removals, group and single-tree selection) areas must be regenerated within five years of that cut

3.11 12 Concerns were expressed regarding how slow timber grows on the RGNF, especially *in the Creede area.*

FVS and FORPLAN models incorporate expected growth rates found on the Forest, including the Creede area of the Divide district.

3.11.13 The draft EIS and FP fail to disclose "where projected tree regeneration projections have not been realized due to slow growth rates."

Regeneration and growth rates are two separate issues Regeneration is the process of new trees establishing on a site Once established, their growth rates can be measured See also response above

3.11 14 Concerns were raised regarding how much aspen would be cut where harvesting in spruce/fir stands.

The volume of aspen cut as a result of spruce/fir harvesting in the next ten years will be minimal when viewed in context with the aspen found across the Forest. The reason is that aspen is clonal in structure and is very intolerant of shade and root competition. There are areas on the Forest where mature aspen stands are being invaded, in the understory, by spruce/fir seedlings/saplings and small poles But by the time spruce/fir stands have reached a mature age and are merchantable for harvesting, aspen has become a minor component of (or all but disappeared from) the stand.

3.11.15 A *request was made to discuss the long-term effects of "dealing with trees in terms* of their economic maturity rather than in terms of the entire life cycle"

The Forest does not assume that all harvesting will occur precisely when stands reach economic maturity *ASQ is calculated, using an economic model (FORPLAN), in order to* display a sustained yield from forested stands meeting requirements for suitability ASQ is not a target, hence, harvesting does not have to occur at specific economic intervals (except that harvesting of suitable lands with even-aged systems must not occur before stands reach culmination of mean annual increment) Whether regeneration harvesting occurs at "economic maturity" or "biological maturity", the harvest activity is occurring in the same structural class -- and on such a small percentage of the Forest -- and an effects discussion is unnecessary

3.11.16 One commentor preferred the Forest, if it was to plan harvesting, to limit that harvesting to a "sacrificed" "tree farm", using even-aged management.

The Forest needs to have all types of silvicultural systems available for use to meet the many objectives demanded in forested areas An even-aged tree farm approach could greatly increase the risk of loss of "desirable" monocultures to insects or disease, putting greater pressures upon adjoining lands to meet expectations for wood products

3.11.17 A suggestion was made to thin out "small- and medium-sized trees--using criteria based solely on the health of the forest.."

The Forest will use thinning practices, where possible, in line with management objectives. Most of the Forest will be unavailable for thinning because of lack of access